FACTORS ASSOCIATED WITH SAFE MEDICATION ADMINISTRATION IN SPECIFIED RESIDENTIAL FACILITIES FOR OLDER PERSONS WITHIN THE METRO-NORTH, WESTERN CAPE PROVINCE

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DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

Background: With the current population growth, the population is also ageing which leads to more chronic diseases and the elderly receiving multiple medications. In South Africa, the Western Cape Province has the third-largest proportion of elderly persons (Statistics South Africa, 2019). However, limited published research exists on factors associated with safe medication administration in residential facilities for older persons, which attest to the fact that the safety of vulnerable older persons receives little attention. To address this gap in knowledge, the research aimed to determine the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province.

Methods: After obtaining ethics approval from The Health Research Ethics Committee of Stellenbosch University (S19/10/252) as well as permission from the residential facilities for older persons, a non-experimental cross-sectional descriptive design was applied, with a quantitative approach. Pre-testing of a self-administered validated questionnaire during a pilot test allowed for modifications to enhance reliability, validity, and appropriateness for the South African context. With the application of a stratified sampling method, 10 funded and 18 private residential facilities for older persons within the Metro-North, Western Cape Provence, were included. Study participants comprised of all three nurse categories, namely Professional nurses (registered nurses) (RNs) n=60 (48.8%), Enrolled nurses (ENs) n=35 (28.5%), and Nursing auxiliary (assistants) (ENAs) n=28 (22.8%). The response rate was n=123 (60.6%) of the total study population of N=203. Descriptive and inferential analyses were performed using the Statistical Package for the Social Sciences Version 27 (SPSS27), with the support of a biostatistician. Results are presented in bar graphs, tables, and figures.

Results: The description of the results is according to the components in Donabedian's Structure-Process-Outcome standards of the Quality of Care Model (2005:691-729). Study results showed that the workforce was mature, with n=34 (27.6%) having more than nine years of work experience. A total of n=43 (35.0%) did not receive medication training in the last five years. Increased workloads n=93 (75.6%) was perceived by participants as the highest source of job pressure. Organisational resources and infrastructures showed constraints in terms of medication storage difficulties, n=56 (45.5%), and blisters in an incorrect order, n=68 (55.3%). Procedures followed by the nurses during medication administration indicated various weaknesses, such as the negation of the performing of thorough checks in favour of administering medications based on assumptions that it would be correct, as n=95 (77.2%)

will not check the content of blisters or containers, assuming it was correct. This was despite n=102 (82.9%) of the study participants who did come across incorrect content when administering medications. Furthermore, a witness signature was not required when making amendments to the MARs, n=47 (38.2%). A total of n=5 (4.1%) conceded that they signed the MAR charts before administering the medications. The use of technology was limited, as almost half of the participants did not use computers in the workplace, n=58 (47.2%). Missing of medication altogether was the most predominant medication error encountered in the facilities, n=79 (64.8%). Statistical tests showed a significant correlation between medications administered at the wrong times and interruptions during medication rounds p = <.001. Also, the most common error of medication accountability was not signing for medication administered, n=70 (56.9%).

Conclusion: From these study results, it was clear that determining the factors associated with safe medication administration in the residential facilities for older persons could assist with avoiding medication errors among older persons to prevent harm and death. Recommendations regarding the implementation of the prescribed staffing model and increased medication training should be emphasised. A multifaceted approach is advised to address constraints such as bulky medication storage systems and inadequate workflow processes. Facilities should develop and implement risk management strategies to encourage medication error reporting. Also, further research is needed to identify the prevalence of medication errors in residential facilities for older persons. Therefore, the constant review of evidence-based practices can ensure effective ways to provide for the needs of the vulnerable elderly.

Keywords: medication, medication administration, medication errors, elderly, and residential facilities (old age homes)

OPSOMMING

Agtergrond: Met die huidige bevolkingsgroei verouder die bevolking ook en dit lei tot meer kroniese siektes en bejaardes wat verskeie medikasies ontvang. In Suid-Afrika het die Wes-Kaap Provinsie die derde grootste persentasie bejaardes (Statistieke Suid-Afrika, 2019). Meer nog, beperkte gepubliseerde navorsing bestaan oor faktore geassosieer met veilige medikasietoediening in residensiële fasiliteite vir ouer mense, en dit is ’n bewys dat die veiligheid van kwesbare ouer mense min aandag ontvang. Om hierdie gaping in kennis aan te spreek, was die doel van die navorsing om die faktore geassosieer met veilige medikasietoediening in spesifieke residensiële fasiliteite vir ouer mense in die Metro-Noord, Wes-Kaap Provinsie te bepaal.

Metode: Ná die verkryging van etiese goedkeuring by die Gesondheidsnavorsingsetiekkomitee aan die Universiteit Stellenbosch (S19/10/252) asook toestemming van die residensiële fasiliteite vir ouer mense is ’n nie-eksperimentele, beskrywende, deursnee navorsingsontwerp met ’n kwantitatiewe benadering gevolg. Vooraf toetsing van 'n self-geadministreerde gevalideerde vraelys is tydens ’n loodstoetsing geïmplementeer en het veranderinge toegelaat om betroubaarheid, geldigheid en toepaslikheid vir die Suid-Afrikaanse konteks te verbeter. Met die toepassing van ’n gestratifiseerde steekproefmetode is 10 befondsde en 18 privaat residensiële fasiliteite vir ouer mense in die Metro-Noord, Wes-Kaap Provinsie, ingesluit. Studiedeelnemers het bestaan uit al drie verpleegkundige kategorieë, naamlik Professionele (geregistreerde) verpleegkundiges (GV’s) n=60 (48.8%), Ingeskrewe verpleegkundiges (IV's) n=35 (28.5%), en Ingeskrewe verpleeghulpe (IVH’s) n=28 (22.8%). Die reaksiekoers was N=123 (60.6%) van die totale studiebevolking van N=203. Beskrywende en afgeleide ontledings is uitgevoer met behulp van die Statistiese Pakket vir Sosiale Wetenskappe, weergawe 27 (SPSS27), met die steun van 'n biostatistikus. Resultate word in staafgrafieke, tabelle en figure aangebied.

Resultate: Die beskrywing van die resultate is volgens die komponente in Donabedian se Kwaliteit van Sorg Model naamlik: Struktuur, Proses, en Uitkomste (Donabedian, 2005:691–729). Studieresultate het getoon dat die arbeidsmag volwasse was, met n=34 (27.6%) met meer as nege jaar se werkservaring in bejaardesorg. 'n Totaal van n=43 (35.0%) het nie medikasie-opleiding in die afgelope vyf jaar ontvang nie. Verhoogde werklading n=93 (75.6%) is deur deelnemers beskou as die grootste bron van werksdruk. Organisatoriese hulpbronne en infrastruktuur het beperkings ten opsigte van medikasiebergingsprobleme getoon, n=56 (45.5%), en “blisterpakke” in verkeerde volgorde, n=68 (55.3%). Die prosedures wat die verpleegsters tydens medikasietoediening gevolg het, het verskeie swakhede aangedui, soos

die verwaarlosing van die uitvoering van deeglike kontroles ten gunste van die toediening van medikasie gebaseer op aannames dat dit korrek sou wees, soos aangedui deur n=95 (77.2%) wat nie die inhoud van “blisterpakke” of houers nagaan nie, maar bloot sou aanvaar dat dit korrek was. Dit was ten spyte van n =102 (82.9%) van die studiedeelnemers wat verkeerde inhoude teëgekom gekom het wanneer medikasie toegedien is. Verder was ’n getuiehandtekening nie nodig wanneer wysigings aan die medikasietoedieningsrekords gemaak is nie, n=47 (38.2%). ’n Totaal van n=14 (11.4%) het toegegee dat hulle die medikasietoedieningsrekords onderteken het voordat hulle die medikasie toegedien het. Die gebruik van tegnologie was beperk, aangesien byna die helfte van die deelnemers nie rekenaars in die werkplek gebruik het nie, n=58 (47.2%). Die algehele uitlating van medikasie was die mees oorheersende medikasiefout wat in die fasiliteite teëgekom is, n=79 (64.8%). Statistiese toetse het ’n beduidende korrelasie getoon tussen medikasie wat op die verkeerde tye toegedien is en onderbrekings tydens medikasierondtes p = <.001. Daarbenewens was die mees algemene fout van medikasie-aanspreeklikheid die versuim om te teken vir medikasie wat toegedien was, n=70 (56.9%).

Slotsom: Uit hierdie studieresultate was dit duidelik dat die bepaling van die faktore wat met veilige medikasietoediening in die residensiële fasiliteite vir ouer mense geassosieer word, kan help met die vermyding van medikasiefoute onder ouer mense om skade en dood te voorkom. Aanbevelings oor die implementering van die voorgeskrewe personeelmodel en verhoogde medikasieopleiding moet beklemtoon word. ’n Veelsydige benadering word aangeraai om beperkings soos lywige medikasiestoorstelsels en onvoldoende werkvloeiprosesse aan te spreek. Fasiliteite moet risikobestuurstrategieë ontwikkel en implementeer om medikasiefoutverslagdoening aan te moedig. Verdere navorsing is ook nodig om die voorkoms van medikasiefoute in residensiële fasiliteite vir ouer mense te identifiseer. Daarom kan die konstante hersiening van bewysgebaseerde praktyke effektiewe maniere verseker om vir die behoeftes van kwesbare bejaardes voorsiening te maak.

Sleutelwoorde: medikasie, medikasietoediening, medikasiefoute, bejaardes, en residensiële fasiliteite (ouetehuise)

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ABBREVIATIONS

AE	Adverse event
BCMA	Bar code medication administration system
EN	Enrolled nurse
ENA	Auxiliary nurse (assistant)
ISMP	Institute for Safe Medication Practices
MA	Medication administration
MAR	Medication administration record
ME	Medication error
NCCMERP	National Coordinating Council for Medication Error Reporting and Prevention
RN	Professional nurse (registered nurse)
SANC	South African Nursing Council
WCP	Western Cape Province
WHO	World Health Organisation

CHAPTER 1
FOUNDATION OF THE STUDY

1.1 INTRODUCTION

Worldwide, significant population growth is occurring, and the population is also ageing. According to the projections of the United Nations, ageing populations will double from 2017 to 2050, with the total people over the age of 80 to triple (United Nations, 2017). In the South African context, the country's population is 58.78 million, with 6.1% over the age of 60 years (Statistics South Africa, 2019). The Western Cape Province (WCP) accommodates about 11.4% of the country's population, and the province has the third-highest proportion of elderly persons in the country. Projections are that migration from outside South Africa and from Gauteng to the Western Cape will increase in the next decade (Statistics South Africa, 2019). Also, the National Health Act 61 of 2003, Section 2 (c) (iv), identifies the elderly as a vulnerable group and prescribed that their rights are respected, promoted, and protected (RSA, 2003). Together with ageing comes specific challenges, such as poor health, chronic diseases, and a deterioration in functional abilities (WHO, 2015). The media highlighted the vulnerability of older persons by their coverage of the horrific Life Esidimeni tragedy in Gauteng Province in 2017. The state relocated 1 300 mental health patients from a private registered service provider to unregistered non-governmental organisations, and 144 patients, of whom 18% were older persons, died due to insufficient care, including a lack of medication (Makgoba, 2018:1–56). In the researcher's experience, older persons with dementia and various other psycho-geriatric conditions are also accommodated in residential facilities for older persons in the Metro-North, WCP. As such, the Life Esidimeni incident serves to create an awareness of these older persons' vulnerabilities in terms of potential consequences of insufficient care and lack of medications also within the residential facilities for older persons in the Metro-North, WCP.

Further emphasising the vulnerability of the elderly is the more recent COVID-19 pandemic. This virus had a detrimental effect on specifically the elderly, who are more prone to underlying medical conditions such as diabetes, heart and lung disease (Johns Hopkins Medicine, 2020). On 23 March 2020, government officials found 23 elderly residents abandoned and dead in their beds in a residential facility in Madrid, Spain, together with two nuns who provided the residents' care. Furthermore, an incident was reported on 23 March 2020 in Italy where the staff of a residential care home had to be quarantined, leaving the 84 elderly residents without food for two days (BBC News, 2020). Data from a scientific online publication collected between 17 February 2020 and

24 March 2020 indicated that the mortality rate of residents above 60 years of age due to confirmed COVID-19 were 19.7% of all the deaths in Spain, 26.4% of all deaths in China, and 36.5% of all deaths in Italy (Roser, Ritchie, Ortiz-Ospina, *et al.*, 2020). On 14 June 2020, the National Department of Health indicated that 54.5% of all deaths in South Africa due to COVID-19 were people over the age of 60 years (Department of Health, 2020a).

An ageing population that has more chronic diseases and receives multiple medications can increase pressure on nurses working in residential facilities for older persons. One of the biggest challenges is lengthy medication rounds, which increase the margin for error (Qian, Yu, Hailey *et al.*, 2015:427–435). The absence of published research studies on factors associated with safe medication administration in residential facilities for older persons within the Western Cape was the drive for this research. Upon identifying these contributing factors, development and implementation of plans can follow to improve current medication administration practices. The aim was thus to contribute to existing knowledge and the advancement thereof, specifically in the field of medication administration within residential facilities for older persons.

This chapter describes the study foundation, including the research topic, rationale, research aim and objectives, significance of the problem and a brief overview of the research methodology and conceptual framework.

1.2 RATIONALE

Since the ground-breaking report “To Err is Human” broke the silence on the reporting of errors that harm instead of heal patients, numerous research on this topic has been done worldwide (Kohn, Corrigan & Donaldson, 2000:20). Research that identifies factors concerning safe medication administration in nursing homes is mostly done in developed countries, such as the USA, Finland, England, and various other European countries. This research concluded that insufficient provision of human resources, the physical design of buildings, raised levels of noise in the environment, time constraints, interruptions and distractions, as well as insufficient training and staff lacking in knowledge, can all contribute to errors concerning medication for the elderly (Al-Jumaili & Doucette, 2017:470–488; Ferrah, Lovell & Ibrahim, 2017:433–442; Qian *et al.*, 2015:427–435). Also, incorrect policies, poor communication and the absence of proper medication error reporting systems can contribute to making medication errors (Ferrah *et al.*, 2017:433–442). The estimation is that the elderly receives as much as two to nine different medications per day, which increases the risk for adverse drug events due to the slowdown of metabolic rates in the elderly. Globally, the symptoms from adverse drug events are often wrongly

diagnosed as new diseases, leading to the prescription of even more medication (Dagli & Sharma, 2014:1–2).

From the available literature, one can deduce that there could be similarities in the challenges that nurses experience in South African residential facilities for older persons. From the researcher's experience conducting health assessments on behalf of the Department of Social Development in residential facilities for older persons in the WCP, it is clear that facilities heavily supplement inadequate nursing staff totals with auxiliary staff and care workers to do professional nursing tasks such as administration of medication. This results in the decanting of medication from their original containers into pill dispensers, which are then later administered to frail care residents by professional nurses (RNs), enrolled nurses (ENs) and -auxiliary nurses (ENAs). This is although the policy document that serves as guideline for residential facilities for older persons, "Medication Management in Residential facilities for Older Persons" of November 2011, states that the administration of medication must be consistent with the scope of practice of nurses (Department of Health, 2011b). The scope of practice of ENAs in South Africa only includes the provision of elementary nursing care under the supervision of the RN (RSA, 2005:25; SANC 1984:12). Furthermore, although the above-mentioned document from the Department of Health allows decanting of medication from original containers into pill dispensers, the Department of Social Development, as the registration authority for residential facilities for older persons, prohibits this practice (Department of Health, 2011b; Department of Social Development 2015:15).

However, research in the South African context is absent, and the researcher was unable to find any published studies on factors associated with safe medication administration in residential facilities for older persons in the WCP. This is especially crucial in the light of the ageing population and increased pressure on scarce resources such as the inadequate nursing staff totals, specifically in the WCP, as illustrated above. The consequences of inadequate nursing staff totals could therefore lead to nurses working outside their scope of practice, and reverting to incorrect procedures, such as the decanting of medication into pill dose containers, as described above. With the constant reviewing of evidence-based practices, the aim was to contribute to existing knowledge and the advancement thereof to ensure effective and safe ways to administer medication to the vulnerable elderly.

1.3 PROBLEM STATEMENT

The ageing population has increased chronic diseases and the use of multiple medications poses a big challenge to nurses due to lengthy medication rounds, with an increase in the margin for errors (Qian *et al.*, 2015:427–435). According to the World Health Organization (WHO), medication errors are a worldwide phenomenon and prevalent in all health care systems. It is a leading cause of damage, preventable harm, and death, costing $42 billion globally, or about R588 billion annually (WHO, 2019a). Although most errors are unintentional according to the National Health Act 61 of 2003, it is imperative to limit these to an absolute minimum to protect vulnerable groups, such as older persons (RSA, 2003). Nurses owe residents a duty of care, and to enable them, nurses need up-to-date knowledge on the safest medication administration systems to make sure that they provide quality care. However, the researcher was unable to find any published studies on the outcomes of medication errors in South Africa, nor studies specifically done on factors associated with safe medication administration specifically in residential facilities for older persons. Therefore, this study attempted to identify the factors associated with safe medication administration to help nurses with the improvement of current clinical practices and guidelines in the selected facilities for older persons in the Metro-North, WCP, as indicated in Figure 1.2.

1.4 RESEARCH QUESTION

The research question guiding this study was: What are the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province?

1.5 RESEARCH AIM

This study aimed to determine the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province.

1.6 RESEARCH OBJECTIVES

The objectives of the study were to:

- RO.1. Determine the socio-biographical data related to nurses working in the specified residential facilities for older persons within the Metro-North, Western Cape Province.

- RO.2. Investigate the type of organisational resources and infrastructures in specified residential facilities for older persons within the Metro-North, Western Cape Province.

- RO.3. Identify the medication administration process followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, Western Cape Province.

- RO.4. Provide evidence of factors associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, Western Cape Province, as provided by the nurses.

1.7 CONCEPTUAL FRAMEWORK

For this study, the researcher chose the Structure-Process-Outcome Quality of Care Model of Dr Avedis Donabedian as the foundation (Donabedian, 2005:691–729). This model appeared to be the most appropriate to direct the study in terms of its purpose and objectives. The purpose of this study was to determine the factors associated with safe medication administration among nurses working in residential facilities for older persons within the Metro-North, WCP. The identified objectives related to the set aim are listed in Point 1.6, above.

The Donabedian framework (2005:691–729) offers a better comprehension of the theoretically multifaceted relationships between associating factors and safe medication administration in this context. Linking the structure, process and outcomes within this study could provide an all-inclusive view of the phenomenon under investigation, to explain the interplay between associated factors and safe medication administration between nurses in residential facilities for older persons (Smith & Parker, 2015:8). When understanding the factors associated with safe medication administration, it provides the opportunity for corrections (ACT Academy, 2018). Donabedian's framework was integrated into this study when the researcher examined the structural components that impact medication administration processes, such as the socio-biographical data of nurses, organisational resources and infrastructure (Donabedian, 2005:691–729). Therefore, within this study concerning the structural component, the socio-biographical data of nurses included their biographical data (age and gender), and professional biographical data (employment status, nursing category, years of experience, and qualifications). The impact of process components such as national legislation and policies, the national norms and standards, as well as national and institutional medication administration policies on safe medication administration, as explained within the Donabedian framework (2005:691–729) in

Figure 1.1. below, were explored using a questionnaire as a data collection tool. More so, as part of the process component, the medication administration procedures followed by nurses in the selected residential facilities for older persons were identified after using a questionnaire for data collection. Using the data collected from the abovementioned structure and process components, as explained in Figure 1.1., the outcome on the health status of residents was determined. The researcher gained valuable information by examining the relationships between constructs to improve medication administration practices.

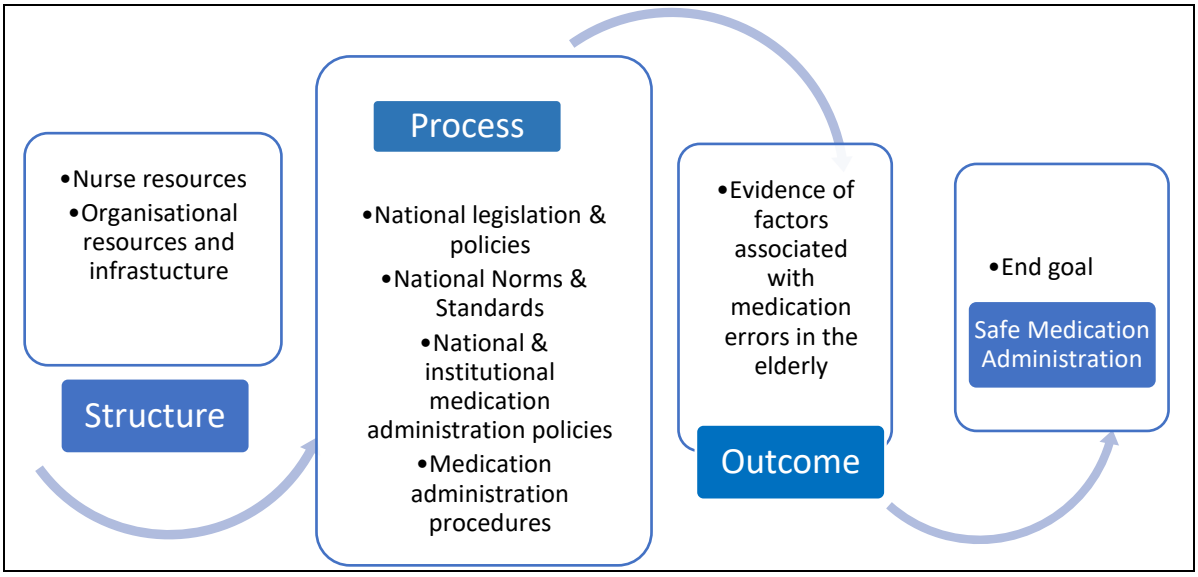

Figure 1.1: Conceptual framework illustrated based on Donabedian's Structure-Process-Outcome Quality of Care Model (Donabedian, 2005:691–729) and showing factors associated with safe medication administration (researcher's design)

1.8 RESEARCH METHODOLOGY

According to the World Health Organisation (2001:1), investigations, experimentation or searches are done in the pursuit of new knowledge, and to enable researchers to comprehend the new knowledge. The methodology or methods used by the researcher, such as procedures and techniques, must be scientifically based, and the research must be done rigorously (Moodley, 2017:340; WHO, 2001:1). The research methodology for this study will be briefly unpacked under the headings: research design, the study setting, population and sample, data collection instrument and data collection process, and the pilot test. A full description of the research methodology will follow in Chapter Three (3).

1.8.1 Research design

To conceptualise the study of factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, WCP, a non-experimental cross-sectional descriptive design was applied, with a quantitative approach. Grove and Gray (2019:30,192) describe a non-experimental descriptive design as a research design to describe phenomena in real-life situations, or as they occur in the natural environment without any manipulation from the researcher. A cross-sectional design allows for the collection of data from various participants simultaneously, at one point in time (Grove & Gray, 2019:30,192). The non-experimental cross-sectional descriptive design was used to obtain detailed information regarding factors associated with medication administration errors, as perceived by the different categories of nurses. The cross-sectional design allowed the researcher to collect data regarding numerous different characteristics of participants with different levels of education, simultaneously, and from both the funded and the private residential facilities for older persons. The aim was to gain a more complete understanding of the phenomenon as it occurs naturally in the residential facilities for older person, without manipulation by the researcher. This provided valuable information that will be used to identify gaps in the current nursing practice in the residential facilities for older persons.

1.8.2 Study setting

The study setting refers to the place or location of data collection, in other words where the study will be done. This can be a highly controlled setting or artificially constructed environment, a partially controlled setting or semi-artificial environment, or a natural, uncontrolled setting (Grove & Gray, 2019:35, 36). The study was conducted in a natural uncontrolled environment, in the 56 funded and private residential facilities for older persons in the Metro-North, WCP, as indicated in Figure 1.2.

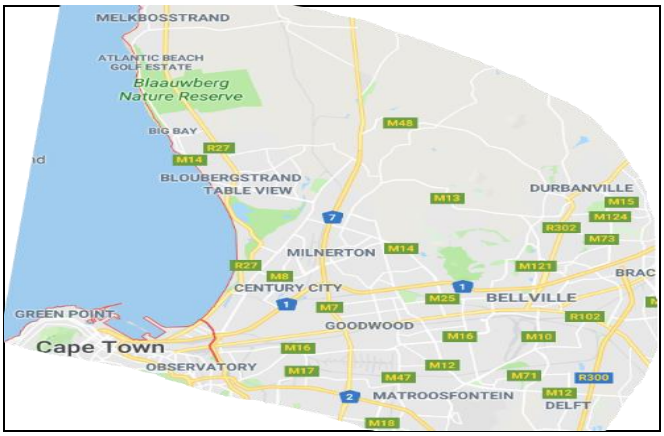

Figure 1.2: Geographical boundaries of Metro-North, Western Cape Province

(Bellville, Brooklyn, Cape Town, Durbanville, Elsies River, Epping, Goodwood, Milnerton, Newlands, Parow, Pinelands, Protea Heights, Table View, Vredehoek, Welgelegen, Woodstock)

1.8.3 Population and sampling

The **target population** consisted of all 430 nurses (N=430) working in the 56 funded and private registered residential facilities for older persons in the Metro-North, WCP, that meet the inclusion criteria, as indicated in Table 1.1 and 1.2. For this study, nurses included RNs, ENs and ENAs. In the 20 funded registered residential facilities for older persons in the Metro-North, WCP, were N=39 RNs, N=55 ENs, and N=65 ENAs, which amount to a target population of N=159 (Table 1.1). The 36 private facilities included a target population of N=271, consisting of N=104 RNs, N=72 ENs, and N=95 ENAs (Table 1.2).

Table 1.1: Representing the N=population of RNs, ENs and ENAs within the 20 facilities. MNF=Metro-North funded residential facilities for older persons

MNF=Metro-North Funded Residential facilities for older persons (N=159)				
Residential facility codes	**RNs (n)**	**ENs (n)**	**ENAs (n)**	**Staff Total**
MNF 1	1	1	3	5
MNF 2	5	6	13	24
MNF 3	3	2	0	5
MNF 4	3	2	4	9
MNF 5	2	2	4	8
MNF 6	1	3	4	8
MNF 7	1	0	0	1
MNF 8	5	1	0	6
MNF 9	1	2	3	6
MNF 10	2	2	4	8
MNF 11	1	2	2	5
MNF 12	0	7	1	8
MNF 13	1	4	0	5
MNF 14	1	4	0	5
MNF 15	1	3	5	9
MNF 16	3	7	5	15
MNF 17	3	2	3	8
MNF 18	3	1	2	6
MNF 19	1	2	4	7
MNF 20	1	2	8	11
N=total	**N=39**	**N=55**	**N=65**	**N=159**

Table 1.2: Representing the N=population of RNs, ENs and ENAs within the 36 facilities. MNP=Metro-North private residential facilities for older persons

MNP=Metro-North Private Residential facilities for older persons (N=271)				
Residential facility codes	RNs (n)	ENs (n)	ENAs (n)	Staff Total
MNP 1	1	0	1	2
MNP 2	3	4	0	7
MNP 3	4	3	1	8
MNP 4	3	0	2	5
MNP 5	2	1	3	6
MNP 6	6	2	2	10
MNP 7	2	0	6	8
MNP 8	3	2	4	9
MNP 9	4	6	2	12
MNP 10	1	4	1	6
MNP 11	3	3	0	6
MNP 12	3	0	3	6
MNP 13	4	4	12	20
MNP 14	2	0	10	12
MNP 15	5	1	1	7
MNP 16	3	1	4	8
MNP 17	1	3	0	4
MNP 18	2	1	2	5
MNP 19	4	2	0	6
MNP 20	2	0	2	4
MNP 21	1	3	0	4
MNP 22	1	1	4	6
MNP 23	2	4	0	6
MNP 24	4	2	4	10
MNP 25	2	0	4	6
MNP 26	1	5	1	7
MNP 27	7	2	8	17
MNP 28	1	2	0	3
MNP 29	6	0	3	9
MNP 30	6	5	11	22
MNP 31	1	1	1	3
MNP 32	5	0	0	5
MNP 33	1	1	0	2
MNP 34	2	2	1	5
MNP 35	2	3	0	5
MNP 36	4	4	2	10
N=total	**N=104**	**N=72**	**N=95**	**N=271**

The researcher submitted the target population data of N=430 as displayed in Tables 1.1 and 1.2 (funded facilities N=159 and private facilities N=271) to a Stellenbosch Biostatics Unit statistician to assist with determining sample size. Grove and Gray (2019:237–239), describe stratified sampling as defining strata or categories of the variables, to ensure equal representation of each stratum in the sample. This is then followed by random sampling for each stratum, to obtain an equal sample from each stratum to ensure representation of each stratum (Grove & Gray, 2019:237–239). The application of stratified sampling assisted with adjustment for the small population size (N=430), thus including equal samples from both the funded and private facilities. This divided the N=56 residential facilities for older persons in n=20 funded and n=36 private facilities, see Figure 1.3. below. After applying stratified sampling, each stratum was randomised, with a selection of 50% of the funded facilities (n=10), and 50% of the private facilities (n=18). This consequently led to the inclusion of randomly selected 10 funded and 18 private facilities as illustrated in Figure 1.3. This sampling method led to a sample size of N=203, n=75 from funded facilities, and n=128 from private facilities. The researcher did not apply further sampling, as to include all nurses in the randomly selected facilities.

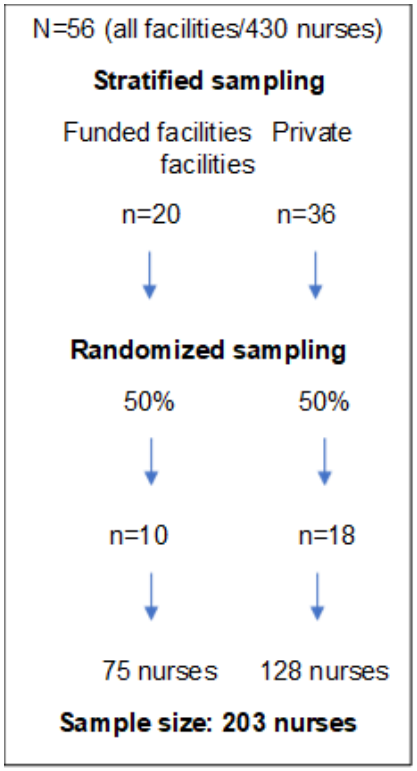

Figure 1.3: Sampling strategy

1.8.3.1 Inclusion criteria

Inclusion criteria include the characteristics that the study participants must have to assist in meeting the goals of the study (Grove & Gray, 2019:230; Polit & Beck, 2010:306). The researcher identified all funded (N=20) and private (N=36) residential facilities for older persons in the Metro-North area of the Western Cape Metropole which were registered at the Department of Social Development. The inclusion criteria for this research study was all nurses (N=430), including RNs (N=143), ENs (N=127), and ENAs (N=160), working day and night shift full-time and part-time in the abovementioned registered facilities.

1.8.3.2 Exclusion criteria

Exclusion criteria apply to participants who meet the inclusion criteria but were specifically excluded due to specific reasons (Grove & Gray, 2019:230; Polit & Beck, 2010:306). The exclusion criteria for this research study was all nurses who were on annual vacation leave, sick leave, and nurses from personnel agencies, from the (N=430) working in registered residential facilities for older persons in the Metro-North area of the Western Cape Metropole.

1.8.4 Data collection instrument

Questionnaires are forms used to elicit information from study participants. Questionnaires can either be distributed in person, made available online, or mailed. Questions on the questionnaires are presented in a structured and consistent way to all study participants (Grove & Gray, 2019:281). A self-administered validated questionnaire was used for this study. The rationale for selecting this specific validated instrument was based on the research objectives, the literature search, and the experience and clinical knowledge of the researcher. The included questions support the constructs and variables based on the chosen theoretical framework. The instrument was in English, the accepted business language in the residential facilities for older persons in the WCP. The researcher obtained written permission on 30 May 2019 for the use of the validated instrument from Professor Ala Szczepura from the Warwick Medical School, the University of Warwick in the United Kingdom, who was the corresponding author from the research article “Medication administration errors for older people in long-term residential care” (Szczepura, Wild & Nelson, 2011:1–10). See Appendix 8. The researcher adjusted the instrument after the pilot test to align it with the South African context.

1.8.5 Pilot test

According to Grove and Gray (2019:43), conducting a smaller version of the proposed study allows the researcher to refine the sampling process or measurement of variables. A qualified statistician from Stellenbosch University assisted through a power analysis to determine a sample size for the pilot test of N=20. These included n=7 from one funded facility which was 10% of the funded facility sample size of n=75 and n=13 from one private facility which was 10% of the private facility sample size of n=128. After receiving approval from the Health Research Ethics Committee (HREC) of Stellenbosch University, the data collection instrument was pre-tested on N=17 (8.37%) participants of the sample size of N=203 within two facilities. These included n=9 from one funded facility which was 12% of the funded facility sample size of n=75 and n=8 from one private facility which was 6.25% of the private facility sample size of n=128. These participants were excluded from the main study, but met the inclusion criteria, and were similar in characteristics. The pilot test sample size of N=17 was smaller than anticipated, due to the declaration of a national disaster. The COVID-19 pandemic led to the instatement of a national lockdown with travel restrictions in South Africa on 26 March 2020. (Department of Co-operative Governance, 2020; Department of Co-operative Governance and Traditional Affairs, 2020a; RSA, 2002).The goal of the pre-test was to assess whether questions were relevant, adequate, understandable to participants and if the responses produced met the study objectives. It allowed the researcher to correct errors and modify the questionnaire to enhance reliability, validity, appropriateness for the South African context, and to accurately measure the variables. A report on the alterations made to the questionnaire, the pilot test findings, and participant feedback will follow in Chapter Three (3).

1.8.6 Validity and reliability

Validity refers to how well the data collection instrument measures the non-concrete concepts identified by the researcher and includes four components (Grove & Gray, 2019:267–269). **Construct validity** requires alignment between what the instrument measures and the operational definitions identified by the researcher (Grove & Gray, 2019:268). **Content validity** requires the instrument to have enough items to allow for the measurement and coverage of the constructs (Polit & Beck, 2010:377,378). In addition, **face validity** refers to whether the instrument appears to participants as if it is measuring the constructs (Polit & Beck, 2010:377). Lastly, **criterion-related validity** requires that the scores obtained by the instrument used by the researcher correspond with scores obtained from another similar instrument (Polit & Beck,

2010:378). In addition to validity, a data collection instrument must also be reliable. To be reliable, the data collection instrument must measure the phenomenon under investigation without change, hence when repeated with the same person within a short time-frame, they should get similar scores (Grove & Gray, 2019:264; Polit & Beck, 2010:373).

The researcher used a validated instrument (as discussed under Section 1.8.4), to test the impact of nurse resources, organisational resources, and infrastructure on the medication administration process. Also, the instrument tested the impact of the medication administration process, including policies and legislation, on the outcome of safe medication administration. With the support of the supervisor, the researcher provided assurance of construct, external, internal, and statistical conclusion validity. During the pilot test, the validated data collection tool was tested, refined, and adapted to fit the South African context. This aligned the instrument with the study's underlying theory, literature review and research objectives. The all ill-inclusive questionnaire assisted the researcher to draw conclusions and develop generalisations to suggest application in other similar settings (see Appendix 7). A full description of validity and reliability will follow in Chapter Three (3).

1.8.7 Data collection

Data collection includes the finding of study participants and the collection of data for the specific study (Grove & Gray, 2019:268). Data collection took place in residential facilities for older persons in the Metro-North, in the following areas: Bellville, Brooklyn, Cape Town, Durbanville, Elsies River, Epping, Goodwood, Milnerton, Parow, Pinelands, Vredehoek, and Welgelegen. The declaration of a national disaster due to the COVID-19 pandemic led to the instatement of a national lockdown with travel restrictions in South Africa on 26 March 2020. (Department of Co-operative Governance, 2020; Department of Co-operative Governance and Traditional Affairs, 2020a; RSA, 2002). Therefore, the researcher was not able to visit the selected facilities for distribution of paper-based questionnaires, or the collection of the data. Consequently, the researcher had to apply at the Health Research Ethics Committee of Stellenbosch University for online distribution of questionnaires, in addition to the paper-based questionnaires as a revised method of data collection. This minor amendment to the original proposal was reviewed and approved on 10 June 2020 (see Appendix 2).

The following strategy was then applied. The researcher sent an email to the residential facilities for older persons that already granted permission to explain the change in data collection method as well as the reasons and obtained permission from the facilities who did not yet respond. This

email included an option for participants to receive the full information flyer and the consent form in English, Afrikaans, or isiXhosa, as the researcher already had the forms translated by the language centre at the University of Stellenbosch (Appendices 4, 5 and 6). The researcher included a link to the residential facilities for older persons for completion of the online questionnaire. The email included a contact number for both the researcher and the supervisor. Participation in the study was voluntary, as stated in the introductory section of the online questionnaire. The researcher obtained informed consent with an insert in the online questionnaire, with a description of terms and definitions and a mandatory field where the participants declared that they provided consent to participate in the study.

The researcher used Google Forms, and online survey app from Google that was released in 2008, as a tool for creating the online personalised questionnaire. The online questionnaire included an introductory session, an invitation to participants, the title of the study, and the timeframe of 20 minutes needed to complete the questionnaire. It also stated a description of the type of questions including qualifications, experience, training and employment status, medication-related questions including policies available to participants, and the medication procedures followed by participants in their facilities. Participants could also express their opinion about the current medication systems in their facilities, as well as the level of job pressures they experience. Also, the introductory section of the online questionnaire included a risk-benefit analysis and stated that there were no immediate benefits for participating in the research study, but that they would contribute to a body of knowledge regarding safe medication administration in residential facilities for older persons. Residents and nurses are likely to benefit from the findings of the research in the future.

However, several managers made the researcher aware of the fact that some nurses do not have the resources or the skills to complete online questionnaires. In June 2020, due to the researcher's work, she had to assess the implementation of guidelines for the management of COVID-19 in selected residential facilities for older persons. This granted the researcher the opportunity to deliver paper-based questionnaires, including the information flyer and consent form in self-seal envelopes, to selected facilities who requested it. The information sessions were telephonic, to allow participants to clear uncertainties. Due to the unfeasibility of attaching a small snack bar to the paper-based questionnaires as a reward, the researcher also offered all participants the opportunity to receive an airtime voucher to compensate them for their time. The researcher placed a note with the questionnaire in the envelope, with the same request that was on the online questionnaire. It stated that if the participant wanted to receive an airtime voucher,

they could indicate their mobile phone service provider and a mobile phone number to which they want the airtime voucher sent. What followed was a process of delivering the questionnaires to the sanitising stations, where they were decontaminated, before delivering them to the manager. The collection took place on a prearranged date and time, after the sealed questionnaires were decontaminated again. The researcher then used a Mobile Banking App to purchase prepaid airtime for the participants, which was then loaded directly onto their mobile phones. Data collection continued in facilities until a sample size of N=123 was obtained.

Table 1.3: Data collection timeframe

	Start date	Completion date
Online questionnaires	12 June 2020	30 August 2020
Paper-based questionnaires	27 July 2020	21 August 2020

1.8.8 Data analysis

Data analysis consists of a methodical process to organise and give structure to the data. The purpose of the analysis of the data is to obtain meaning from the results to find trends and patterns (Polit & Beck, 2010:292,463). The researcher captured the raw data on a Microsoft Excel spreadsheet by entering participants' numbers in the vertical columns and the variables horizontally. By using the Microsoft Excel spreadsheet, the researcher and a qualified statistician from Stellenbosch University analysed the data by using a software program, the Statistical Package for the Social Sciences Version 27 (SPSS27). The researcher then used descriptive statistics to summarise and describe the collected data. Descriptive statistics includes the measuring of the central tendency that indicates the average score in a distribution (Grove & Gray, 2019:302; Polit & Beck, 2010:397). Standard deviations displayed the measures of dispersion, which indicated the extent to which individual participants' scores deviated from others (Grove & Gray, 2019:304). The researcher analysed nominal and ordinal data from codes allocated to the responses to the questions, such as the professional category. Also, numbers were allocated to the ordinal data responses to the statements. The researcher presented the results in frequency tables, bar charts, figures, and conceptualised diagrams.

1.9 ETHICAL CONSIDERATIONS

In research, ethical considerations are the consideration of ethics, and includes critical thinking about ethical issues. It also comprises of the reflecting on and the analysis of moral decisions (Moodley, 2017:4-6). The World Medical Association developed the Declaration of Helsinki, a statement including ethical principles for medical research involving humans (Moodley, 2017:406). Therefore, the Declaration of Helsinki's ethical principles formed the foundation of this study, as the research involved human participants. The Health Research Ethics Committee of Stellenbosch University reviewed the proposal and provided approval on 17 February 2020, reference number S19/10/252 (Appendix 1). The researcher submitted the proposal to both the Western Cape Department of Health and Department of Social Development and both stated that approval was not within their authority. Both departments advised the researcher to obtain permissions from the individual facilities, which the researcher did. Due to the COVID-19 pandemic, which led to the instatement of a national lockdown in South Africa on 26 March 2020, as described in Section 1.8.7, the researcher applied for a minor amendment to the original proposal from the Health Research Ethics Committee of Stellenbosch University (Department of Health, 2020a). This included a request for online distribution of questionnaires in addition to the distribution of paper-based questionnaires, as a revised method of data collection. Approval was received on 10 June 2020. The ethical considerations included adherence to the ethical principles of respect for persons' autonomy, beneficence, and the principle of justice.

1.9.1 Respect for participants

Respect for people includes respect for the autonomy of persons, in other words, to respect their rights to make informed decisions (Moodley, 2017:54). To incorporate this ethical principle in this research study, the researcher prepared detailed information flyers and informed consent forms in three languages, including English, Afrikaans, and isiXhosa. Before commencing the study, the researcher obtained written consent from the selected facilities' managers and/or directors, and thereafter from participants, in either English, Afrikaans, or isiXhosa. The researcher did offer the services of a translator to clarify certain concepts in isiXhosa, but no participants indicated the need for a translator. This was not necessary for Afrikaans-speaking participants, as the researcher is fluent in Afrikaans. To obtain a balance between harming and benefitting people, a risk-benefit analysis must be done before commencing with interventions. In this way, the maximum benefits could be obtained for people (Moodley, 2017:73). In this research study, this was obtained by inserting an information flyer. The information in the flyer at the beginning of the online questionnaire included a background of the research and listed the benefits to participants

as well as their responsibilities. Also, it included full disclosure of any potential risks and the clearing up of any uncertainties. There was also an undertaking by the researcher to avoid all possible harm and the assurance that participants may leave the study at any time, without implications to themselves. The participants could then exercise their legal and ethical rights to give uncoerced written voluntary consent for participation.

1.9.2 Respect for participants' privacy, confidentiality, and anonymity

Respect for people further includes providing assurance of anonymity, and that their records are kept confidential. By following this principle, their privacy is protected (Moodley, 2017:61). In this research study, the first objective was to determine the socio-biographical data related to nurses in the selected residential facilities for older persons. Therefore, the researcher followed the prescriptions of the Protection of Personal Information Act 14 of 2013 to protect identifiable private information and maintain confidentiality, privacy, and anonymity throughout the study and afterwards (RSA, 2013:15). After consent was given by facility managers/directors, the questionnaire developed by Szczepura *et al.* (2011:1–10) was coded with a number for each facility, but participants were unidentifiable. To ensure confidentiality and anonymity, participants completed a paper-based questionnaire or a questionnaire online, without divulging their names. Only the researcher, statistician, and supervisor were able to access the raw data. Storage of the original questionnaires are at the researcher's office in a safe—with a confidential code known by the researcher only—and the processed data is stored online and is password protected.

1.9.3 Right to protection from discomfort and harm

The ethical principle of beneficence refers to doing good and minimising harm when working with people. This includes providing assurance to study participants of the clinical competence of the researcher (Moodley, 2017:71). To ensure compliance with the principle of beneficence, the researcher assured participants that she had the necessary clinical competence to conduct the study, including the skills and knowledge concerning the medication administration and research process. Furthermore, participants were guaranteed that a risk-benefit analysis was done before the study began, to confirm that benefits outweigh any possible risks, or harm, as described in 1.9.1. Also, the researcher informed participants that a pilot test preceded the main study and any errors that could cause discomfort were rectified. To further reduce discomfort, participants were notified in the information flyer in the online questionnaire about the approximate duration needed to complete the questionnaire. The researcher approached participants with sensitivity and

reassured them about the quality of the research and integrity of the researcher. A minimal risk study is considered a research study where participants experience minimal temporary discomfort which is similar to what they will experience in their everyday lives. Any temporary discomfort experienced during a research study will thus end when the study is complete (Grove & Gray, 2019:101). As the proposed study met the criteria for a minimal risk study, the possibility of harm and discomfort to participants were minimum. Therefore, participants did not experience more discomfort than they would have in daily life. Also, any discomfort that they did experience ended on the completion of the study.

1.9.4 Adherence to the principles of justice

The ethical principle of justice includes the right to a fair selection process and fair treatment (Grove & Gray, 2019:102). The inclusion and exclusion criteria set out in 1.8.3.1 and 1.8.3.2 guaranteed that selection was fair, as it included all nurses in the 20 funded and 36 privately registered residential facilities for older persons in the Metro-North, WCP. Also, the researcher treated participants fairly by adhering to the principles of the written informed consent agreement, as discussed in 1.9.1.

1.10 OPERATIONAL DEFINITIONS

- **Auxiliary nurse/assistant (ENA)** is trained to provide elementary nursing care under the supervision of the registered nurse and according to her/his scope of practice (RSA, 2005:25; SANC 1984:12).

- **Caregiver** in a residential facility for older persons is described as any person providing care, including psychological, physical, material or social assistance to the older person (RSA, 2006:6).

- **Enrolled nurse (EN)** is a nurse that is registered to practise basic nursing, under the supervision of a registered nurse and according to his/her scope of practice (RSA, 2005:25; SANC 1984:10).

- **Frail older person** is described as an older person that cannot care for him/herself, based on mental or physical conditions, and consequently needs 24-hour care (RSA, 2006:6).

- **Medication administration** is one phase of the medication management process, including the check of the doctor's script for accuracy, possible contraindications for

example drug interactions or allergies, administering the medication and the evaluation of the resident after administration (Ferrah *et al.*, 2017:433–442).

- **Medication errors (MEs)** are described as any error that is medicine related, occurring in any medication process stage, which can lead to harm, suffering, unnecessary hospitalisation, additional costs and death (Metsälä & Vaherkoski, 2014:12).

- **Older person:** The Older Persons Act 13 of 2006 states that an older person is a male 65 years or older, or a female 60 years or older (RSA, 2006:6). Hereafter also referred to as the care recipient.

- **Outcome measures:** These measures validate the excellence and efficiency of the healthcare provided. Outcomes measure the effect of care on patients, while technical outcomes measure a reduction in mortality, infections, injury, and adverse events (Donabedian, 2005:691–729).

- **Process measures** indicate how processes and procedures contribute towards reaching anticipated outcomes. It therefore includes all practices relating to the standard of care. If processes and procedures are properly applied, it should lead to quality improvement. Therefore, these measures are a significant connection between structures (input) and outcomes (Donabedian, 2005:691–729).

- **Professional nurse/registered (RN)** is a trained and knowledgeable person registered at the South African Nursing Council in terms of Section 31 of the Nursing Act 33 of 2005, and mandated to practise all-inclusive nursing independently, and take responsibility and accountability for their actions (RSA, 2005:25).

- **Resident** refers to an older person who is accommodated in a residential facility in terms of the regulations of the Older Persons Act 13 of 2006 (RSA, 2006:8).

- **Residential facility:** This is a structure or building where an older person is provided with accommodation and 24-hour service (RSA, 2006:6).

- **Structure measures** refer to the setting where people receive care, which can be a healthcare agency, nursing home or hospital. It includes organisational and nurse resources, and infrastructure that is available to provide the care. It is also referred to as input measures (Donabedian, 2005:691–729).

1.11 DURATION OF THE STUDY

The Health Research Ethics Committee of Stellenbosch University provided approval for this study on 17 February 2020, reference number S19/10/252 (Appendix 1). Pilot testing took place from 12 to 19 March 2020. Postponement of data collection took place due to the COVID-19 national lockdown in South Africa from 26 March 2020 (Department of Health, 2020b). The Health Research Ethics Committee of Stellenbosch University provided approval for a minor amendment of the proposal on 10 June 2020, and online distribution of questionnaires for the main study commenced on 12 June 2020 and ended on 30 August 2020 (Appendix 2). Data collection with paper-based questionnaires for the main study commenced on 27 July 2020 and ended on 21 August 2020. Submission of the final thesis for examination was 16 November 2020.

1.12 CHAPTER OUTLINE

The chapters of the thesis are as follow:

Chapter 1: Foundation of the study

This chapter describes the study foundation, including the research topic, rationale, research aim and objectives, significance of the problem and a brief overview of the research methodology and conceptual framework.

Chapter 2: Literature review

This chapter includes the key findings of related studies that focus on medication administration done internationally and local. The selected conceptual framework for the study is also explained.

Chapter 3: Research methodology

This chapter contains a thorough description of the research methodology applied in the study, including a report on the pilot test and the validity and reliability relevant to quantitative research.

Chapter 4: Results

This chapter includes the data analysis, data interpretation, and a discussion of study results in line with the objectives of the study.

Chapter 5: Discussion, conclusions, and recommendations

This chapter presents the conclusions drawn and discusses recommendations based on the findings.

1.13 SIGNIFICANCE OF THE STUDY

With the information obtained about the impact of an increased population, and larger ageing population specifically in the Western Cape, the pressure on scarce resources in residential facilities for older persons are bound to increase proportionally (Statistics South Africa, 2017; United Nations, 2017). Hence, with more residents with complex diagnoses and multiple medications, and medication administration being the most time-consuming task for nurses, the margins of errors also increase (Qian *et al.*, 2015:427–435). Although medication errors occurred in each of the phases of medication management, most occurred in the medication administration phase. Though they were the most serious, they were also the most preventable (Ferrah *et al.*, 2017:433–442). RNs are responsible for all medication administration in the residential facilities for older persons (Department of Health, 2011:1). It could thus be deduced that RNs play a major role in the prevention of medication errors during the administration phase. However, research on factors associated with safe medication administration in residential facilities for older persons in the WCP was unavailable. As such, the findings of this study may contribute to the overall body of knowledge about factors associated with medication administration in residential facilities for older persons. Based on these findings, evidence-based practices could be reviewed, policies developed and implemented, to improve current medication administration practices and improve quality of care.

1.14 SUMMARY

A discussion of the background of this research problem included the population growth and ageing population, which intensify the pressure on scarce resources in residential facilities for older persons. The exposure of vulnerable older persons to complex diagnoses and usage of multiple medications results in time-consuming medication rounds for nurses working in the residential facilities for older persons. According to Donabedian (2005:691-729), various structural measures such as nurse resources, organisational resources and infrastructures have an impact on process measures. Process measures that impacted safe medication administration were national legislation, policies, norms and standards, and institutional medication policies and procedures. These structures and process measures all contributed to the desired outcome, which was safe medication administration. However, if errors occurred in the structure or process components, it could lead to harm or death of residents. When the research question “What are the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province?” was answered, it gave a better

understanding of the problem, with the adaption of policies and procedures to improve adherence to safe medication administration practices.

1.15 CONCLUSION

There is a need for constant review of evidence-based practices to ensure effective ways to provide in the needs of the vulnerable elderly. By identifying contributing factors that were associated with safe medication administration in specified residential facilities for older persons within the Metro-North, WCP, development, and implementation of plans could follow to improve current medication administration practices. Research of this topic therefore contributes to existing knowledge and the advancement thereof. In Chapter Two (2), a discussion of the appropriate literature related to the problem described will be applied.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

As discovered during the preliminary literature review that formed the foundation of this study, there are substantial gaps in our knowledge of what is construed as safe medication practices in residential facilities for older persons, especially within the Metro-North, WCP. In healthcare settings worldwide, thorough research on the medication management process occurred over the years. This process involves various aspects, of which the administration phase can offer the biggest challenges to nurses. According to Ferrah *et al.* (2017:433–442) medication errors can cause serious harm or death to patients. Although patients can be harmed, Metsälä and Vaherkoski (2014: 12–28) states that medication errors are often not reported due to fear of penalties. Also, where intentional negligence occurred and where commonly incorrect practices are being followed continuously, patient safety are compromised (Metsälä & Vaherkoski, 2014: 12–28).

The situation in elderly care is possibly worse, especially in developing countries such as South Africa, as indicated in a report by Umhlaba Development Services (2010:33,34,82). The Department of Social Development tasked this group as a service provider to audit the quality of services in residential facilities in South Africa in 2010. From the 405 residential facilities for older persons, 21% indicated that they had no access to the services of an RN, with the North West Province the highest with 65% of facilities without access to RNs. Unfortunately, the report did not supply information specific to the WCP in terms of facilities that had access to the services of RNs. They concluded that limited financial resources led to heavy supplementing of inadequate nursing staff totals with auxiliary staff and care workers (Umhlaba Development Services, 2010:33,34,82). The increased pressure on scarce resources necessitates the constant review of evidence-based practices to ensure effective ways to provide in the needs of the elderly. With medication errors and unsafe medication practices as the foremost reason for injury and preventable harm in health organisations across the world, the examination of medication errors is key to obtain insight into possible factors that can be associated with the safe administration of medication (WHO, 2019a).

This literature review about factors associated with safe medication administration in residential facilities for older persons has been organised by using the outline of the conceptual framework in Chapter One (1), Section 1.7, so as to categorise the key measures into the structure, process, and outcome measures. *Structural measures* included a background of the older persons as care recipients, and nurses as resources in the medication administration process. Consecutively, a discussion followed on organisational infrastructures and resources. Incorporated in this section was the equipment provided, such as medication storage systems and medication administration record (MAR) folders. The discussion of *process measures* included the legislature applicable to phases of the medication management process, with a specific focus on the administering phase. This consisted of international, South African, and WCP legislature and policies. Under the medication administration process, the literature reviewed included the prescribing phase, dispensing, administration of medication, the monitoring of residents, and record keeping. The review covered a variety of topics, such as ordering and supplying medication, the length of medication rounds, alterations done on MARs, and medication administered under special circumstances. Also, an examination of the use of technology in medication administration followed, including the use of computers and mobile phones. The structuring of *outcome measures* included the changes that occurred in residents' health status due to the prevalence of medication errors and the cost implications of these medication errors. The focus on the examining of these errors was to meet the end goal of safe medication administration in residential facilities for older persons.

The purpose of this literature review was, therefore, to gain more information and insight into the factors associated with safe medication administration to the elderly in residential facilities, as background to answer the research question: "What are the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province?". Next, a discussion will follow to indicate how the researcher elected and reviewed the literature.

2.2 ELECTING AND REVIEWING THE LITERATURE

According to Grove and Gray (2019:150), a literature review is a process of finding up-to-date scientific and theoretical reports about a specific topic. Then, a critical evaluation of the selected literature follows, with the synthesising of the content, which a researcher can use to find gaps that exist in a specific area and solve problems in evidence-based practice.

In this study, the researcher did a review to understand and synthesise available literature with bearing on medication management compliance and safety in residential facilities for older persons. Electronic databases were used, including PubMed, CINAHL, Medline, and Google Scholar, and the researcher found about 56 articles initially, using keywords in various combinations and singularly. These keywords included “medicine”, “medication”, “medication management”, “errors”, “elderly”, “older persons”, “medication technology”, and “nursing homes”. Applying filters to only include studies from 2010 to 2020, and only those published in English with full text available, narrowed the search. Articles that were excluded were those about self-administration of medication, medication errors occurring in transfers between hospitals and nursing homes, and articles referring to general quality care such as prevention of falls. References to older studies in the reviewed articles led to the further inclusion of landmark studies, such as the article “To err is Human” (Kohn *et al.*, 2000).

The Johns Hopkins Nursing Evidence-Based Practice: Models and Guidelines (Dang & Dearholt, 2017:Appendix C) was used to evaluate the level of evidence and quality of the literature. The researcher used the guidelines provided by Grove and Gray (2019:155–159) to critique the articles to determine their contribution to understanding the factors associated with safe medication administration. Also, the researcher included references to textbooks, acts, and regulations. During her literature search, the researcher could not find any published articles in the last 10 years on medication administration in residential facilities for older persons in South Africa. Lastly, the process of analysing the articles to find prevalent themes, identifying gaps in the current knowledge and noting recommendations for future research followed, with the final selection of 39 articles for a thorough review. The outlay and structure of this literature review are based on Donabedian’s Quality of Structure-Process-Outcome Quality of Care Model (Donabedian, 2005:691–729).

2.3 STRUCTURAL MEASURES

According to Donabedian (2005:691–729), the structural measures include aspects of the service, also called input measures or care delivery settings. This is either a hospital, healthcare agency or nursing home, and includes available professional and organisational resources to deliver the care (Donabedian, 2005:691–729). The National Health Service in the United Kingdom described the service in more detail, adding examples such as staff-to-patient ratio and the qualifications of staff (ACT Academy, 2018). South Africa’s National Health Act 61 of 2003, Regulation 67 of 2018: Norms and Standards Regulations Applicable to Different Categories of Health Establishments

describes facilities and infrastructure as structural measures according to Donabedian's model (Department of Health, 2018:29). Also, the National Core Standards for Health Establishments in South Africa published in 2011 by the Department of Health describe the facilities and infrastructure to be available for health establishments (Department of Health, 2011a). The aim is to measure the outcome of these structural variables on medication administration, and thus the effect on resident outcomes (Fujita, Moles & Chen, 2018:3). In this study, the settings where the elderly receive care are residential facilities for older persons. To ensure comprehensiveness, the researcher included the elderly resident as a care recipient in the structural measures.

2.3.1 The care recipients in residential facilities for older persons

As mentioned in the introduction section in Chapter One (1), there is a global increase in the number of older persons and the United Nations has estimated that people over the age of 80 years will triple in the next 30 years due to higher life expectancies (United Nations, 2017). Since the United Nations published its latest report on demographic profiles in 2019, the percentage of the total world population over the age of 65 years was 9.3% in 2019, with an estimate of 15.9% in 2050. For more developed regions or high-income countries, such as Europe, the United States of America, New Zealand, and Australia, the current population over the age of 65 years is 19.3%, with an estimate of 26.9% in 2050. In South Africa, the current population over the age of 65 years is 5.5%, with an estimate of 10.5% in 2050 (United Nations, 2019:5,9,13,1043).

With this increase in population over the age of 65 years, it seems that there is also an increase in poverty in the elderly. The United Nations (2019:xxi) categorised South Africa, Namibia, Botswana, Eswatini, and Lesotho together in the region Sub-Saharan Africa, subregion Southern Africa, with South Africa being an upper-middle-income country. Despite the United Nations categorising South Africa as an upper-middle-income country, Statistics South Africa indicated in their 2017 report that only 22,9% of the elderly in South Africa had private health insurance, with about 3.1 million South Africans receiving government old-age grants (Statistics South Africa, 2017:58, 68). After the national budget speech in February 2020, a media release by the Minister of Social Development confirmed that the total eligible beneficiaries receiving old-age grants had increased from 3.1 million to 3.5 million. This led to an increase of the grants to R1 860 per month, in an attempt to fight poverty and assist vulnerable groups such as older persons (Department of Social Development, 2020a).

Furthermore, statistics also show that 30.8% of the elderly in the WCP indicated that they have a general weak health status, which increases their frailty (Statistics South Africa, 2017:69). Also, concerning non-modifiable characteristics, the elderly residents present challenges especially due to cognitive impairment. In South Africa, current statistics show that 750 000 people have been diagnosed with dementia/Alzheimer's, which can complicate medication processes due to residents' limited insight (Alzheimer's in Action, 2019). With this increasingly poor health status and complex diagnoses, the elderly receives multiple medications. Supporting this notion is a study done by a professor at the Rajasthan University of Health Sciences in India and a postgraduate student. They published an article in the *Journal of International Oral Health* in 2014 on the risks of polypharmacy in the elderly. The authors estimated that the elderly receive as much as two to nine different medications per day, which increases the risk of adverse drug reactions, as metabolic rates slowdown in the elderly. According to Al-Jumaili and Doucette (2018:1420–1427), certain medications are listed on screening tools such as the Beers Screening Tool of Older People's Prescriptions as inappropriate for prescription to the elderly based on their potential ability to cause adverse drug events. Dagli and Sharma (2014:1–2) found that the elderly take between 11.5% to 62.5% inappropriate medications. Globally, the symptoms from adverse drug reactions are often then wrongly diagnosed as new diseases, leading to the prescribing of even more medication (Dagli & Sharma, 2014:1–2).

Confirming the content of the above article is a systematic review by Metsälä and Vaherkoski (2014:12–28), which included 20 studies on medication errors in elderly acute care. The authors included studies with a broad spectrum of research designs over a whole range of countries, such as a qualitative study in Taiwan, a systematic review in Australia, a systematic review in Ireland, an observational study in the United Kingdom, a cross-sectional, longitudinal as well as an observational study in the United States, a discursive paper in Canada, and a population-based intervention study in Finland. At least six studies included in the systematic review collaborate with the multiple medications prescribed to the elderly and highlighted medication errors associated with polypharmacy. The conclusion reached by the authors was the need for improvement in multi-professional teamwork to compile action plans for medication safety, but that the responsibility still lies with nurses to oversee correct administration in terms of correct route and dosage, limiting of multiple medications and identification of side effects (Metsälä & Vaherkoski, 2014:12–28).

Based on the literature discussed in this section, it can be concluded that care recipients pose multifaceted challenges to nurses, especially when administering medications. These challenges

can be due to the increasing higher age of elderly persons, together with an increase in weak health status and the incidence of polypharmacy.

2.3.2 Nurses as a resource in the medication administration process

The Structure-Process-Outcome Quality of Care Model of Dr Avedis Donabedian was the foundation of this study. According to Donabedian's conceptual framework, structural measures include aspects of the service, also called input measures or care delivery settings. As such, nurses are a structure or input measure (Donabedian, 2005:691–729). Therefore, nurses' characteristics have an impact on processes, which has an impact on the outcomes, in this instance: safe medication administration to the elderly in residential facilities for older persons (ACT Academy, 2018; Donabedian, 2005:691–729). According to the World Health Organization, nurses consist of 50% of the global health workforce; therefore one can deduce that nurses globally provide the mainstay of healthcare services (WHO, 2019a). In contrast with nurses being key in providing healthcare services, the Organisation for Economic Cooperation and Development predicts that there are demands for more nurses, given the ageing population, and estimated retirement age of the current workforce from the "baby-boom" generation (OECD, 2017:160). The number of nurses per 1000 of the population also varies greatly between countries. For example, Norway had 18.12 nurses per 1 000 of the population in 2017, New Zealand 10.96 (2017), the United Kingdom 8.29 (2017), the United States of America 8.55 (2015), with South Africa only 3.52 in 2017 (WHO, 2019c). In South Africa, there are currently 286 116 nurses registered at the South African Nursing Council (SANC), the regulatory authority for nurses in South Africa, including RNs, ENs, and ENAs (SANC, 2019).

When examining the gender of nurses in South Africa, only 28 217 are men, which results in a workforce of 90.1% female nurses, correlating with a workforce of 90% female nurses worldwide (Smiley, Lauer, Bienemy, Berg, Shireman, Reneau & Alexander, 2019:14; SANC, 2019). As male nurses are a minority group in the South African workforce as well as worldwide, this phenomenon will be explored in this study, to determine if male nurses are also a minority group employed in the selected residential facilities in the WCP. The nurse workforce is also of a more mature age. The 2017 National Nursing Workforce Survey report, which supplies data on the United States nursing workforce, indicated that the average age of RNs in the United States is 51 years, with nurses older than 60 years at 13.7% (Drennan & Ross, 2019:25–37; Smiley *et al.*, 2019:14). In comparison, the age analyses of nurses provided by SANC indicates an ageing workforce, as 19% of the RNs are over 60 years, and 7% of both ENs and ENAs are now over the age of 60

Nursing employment appears to be mainly in hospitals. Statistics show that hospitals employ 61% of the nursing workforce in the United States, versus only 7% in residential facilities for older persons or nursing homes. The same situation exists in Australia, as 63% of nurses are employed in hospitals versus 11% in residential facilities for older persons or nursing homes; and in Japan, with 61% of nurses employed in hospitals versus 7% in residential facilities for older persons or nursing homes (Drennan & Ross, 2019:25–37). In the local context, despite predictions of future nurse shortages, the SANC indicates that in 2018 only 23.3% of enrolled nurses and 10.7% of enrolled nurse assistants were permanently employed in South Africa (SANC, 2019).

In the global context, categories of nurses, and qualifications are also diverse. According to the World Health Organization (2017:424–426), descriptions of categories of nurses vary from registered nurses, practical nurses, advanced practice nurses, licensed practical nurses, and nurse associates (WHO, 2017). Differences also exist globally in the qualifications required by nurses for practising. Some European countries, such as Luxembourg, offer nurse education only at diploma level, versus Finland, Denmark, the Netherlands, and Ireland that offer nurse education only at the bachelor's degree level. Countries such as Austria, Germany, and Poland offer both diploma and degree-level education (WHO, 2017:424–426). In South Africa, nurses can obtain qualifications in nursing by either a one-year course, leading to enrolment as an ENA, a two-year course, leading to enrolment as an EN, or a four-year course, leading to registration as a nurse. Also, both a diploma and degree-level qualification are available to nurses in South Africa (SANC, 2019). The qualifications of the nurses in this study will be explored, to determine whether their qualifications were on a certificate, diploma or degree level. For RNs, the registration of an additional qualification in Gerontological Nursing Science consists of one academic year. According to a circular published by the SANC (SANC:2016), this post-basic qualification will be phased out to align this nursing qualification to South Africa’s higher education qualifications sub-framework. However, nurses seldom specialise in elderly care, as reflected in the SANC’s statistics for 2018. Up to 2018, only five nurses registered in South Africa for an additional qualification in Geriatric Nursing Science, 10 for a certificate in gerontology, and 11 obtained registration for a post-basic additional qualification in Gerontological Nursing (SANC, 2019).

To highlight the qualifications, competencies, and training of nurses, a modified Delphi study done in the United Kingdom examined the core competencies needed by RNs working in care homes. The panel agreed on 22 competencies vital for RNs working in care homes and recommended that these form the basis for curriculums for RNs who wish to work in an elderly care context. Competencies earmarked as essential included, among others: pain management,

pharmacology, and Dementia care (Stanyon, Goldberg, Astle *et al.*, 2017:582–588). However, the basic curricula containing the content of medication management training can also pose extra challenges. In Botswana, also in Sub-Saharan Africa, researchers did a review of the curricula at different nursing education levels and of nursing regulatory documents, examining the degree to which basic training programmes for nurses in Botswana addressed the prevention of medication errors. The findings of the review emphasised the weakness in the nurses' curricula, as medication management training includes mostly theory from pharmacology courses, but the researchers considered the lack of exposure to real-life situations a limitation (Tshiamo, Kgositau, Ntsayagae *et al*., 2015:18–23).

Supporting these findings of weaknesses in the nurses' curricula is a mixed-method study including 246 RNs and 270 nurse assistants from 20 nursing homes in Belgium. The researchers started with an expert meeting, and later did a cross-sectional survey, to identify the barriers that nurses in Belgium experienced concerning medication management. Their findings show that a lack of knowledge appears to be an even higher concern for nurse assistants than RNs. Using a scale, with one being no barrier and 10 a strong barrier, more than 30% of the participants scored a lack of knowledge on medication interaction and interaction of medication with food as a higher than seven barrier (Dilles, Elseviers, Van Rompaey *et al*., 2011:171–180).

The fact that 50% of the global health workforce consists of nurses, and referencing the ground-breaking report "To err is Human", which indicates that humans do make errors, the importance of nurses as the main human resource for care delivery in residential facilities for older persons is emphasised (Kohn *et al.*, 2000:20; WHO, 2019b).

2.3.3 Organisation infrastructures and resources

Concerning structural measures, the attributes of the organisation in which care provision for the elderly takes place is also a resource that has an impact on processes and outcomes (ACT Academy, 2018; Donabedian, 2005:691–729). Therefore, it is imperative to examine organisational infrastructures and resources that may have an impact on the medication administration processes to decide the outcome of safe medication administration.

A comprehensive literature review, which included 60 studies, investigated various factors that influence medication errors in skilled nursing facilities (Al-Jumaili & Doucette, 2017:470–488). The authors described skilled nursing facilities as treatment centres that provide short-term services from trained nursing staff to patients after discharge from hospitals, such as after having a stroke

(Al-Jumaili & Doucette, 2017:470–488). The researchers categorised the factors by using the SEIPS (Systems Engineering Initiative for Patient Safety) model, of which the environment was one source influencing medication errors. When examining the environment accommodating the elderly, one study indicated that the physical layout of buildings and high noise levels could be barriers that influence medication errors. Another of the included studies conducted in Canada in four long-term facilities found that storage space for medication and charts, lighting, and the location of nursing stations in proximity to residents could be barriers that influence medication errors. Furthermore, four of the 60 studies indicated that interruptions and distractions whilst administering medication can cause medication errors. A limitation of this comprehensive literature review was that the authors included skilled nursing facilities, but excluded studies done in residential care homes (Al-Jumaili & Doucette, 2017:470–488). Consequently, the same researchers did a second study in 2018, using an observational quantitative design where the focus was on individual and work systems that influence adverse drug events in nursing homes (Al-Jumaili & Doucette, 2018:1420–1427). They collected data from three sources: (a) resident medical charts; (b) information about the characteristics of the facilities from the Medicare.gov Nursing Homes Compare website; and (c), by supplying surveys to a director of nursing, RN, and certified nursing assistant (CNA). They concluded that the CNAs in the eight nursing homes involved provide between 80% and 90% of resident care, however, their turnover rate was between 21% and 60% annually. They also lacked basic skills to take vital signs correctly, which harmed adverse drug event incidence. Furthermore, several of the nursing homes had a nurse-to-resident ratio of 1:25 up to 1:36 per shift, which increased the workload and stress of nurses (Al-Jumaili & Doucette, 2018:1420–1427). In this research study, the highest sources of job pressures in the workplace as perceived by the study participants will be explored and discussed.

An illustration of the management of interruptions and high noise levels is a systematic review by Metsälä and Vaherkoski (2014:12–28) including 20 articles on medication errors in the elderly. The findings indicated that some of Finland's hospitals required nurses to wear colour-coded vests and place banners with "do not disturb" signs on medication rooms. The purpose was to counteract the noise and interruptions. A limitation of this study is that the researchers only included articles in acute elderly care settings (Metsälä & Vaherkoski, 2014:12–28).

Concerning physical buildings, organisations must provide infrastructure in the form of a staff complement, to provide care to the elderly. The minimum provision of nursing staff resources for residential facilities for older persons in South Africa is prescribed in the Regulations Regarding Older Persons under the Older Persons Act 13 of 2006 (RSA, 2010). This detailed staffing model

is used to calculate the number of all categories of nursing staff, and caregivers, based on the total hours of care required per week per resident. To demonstrate, 30 frail care residents will need 18 hours of care per resident per week. Calculation of staffing would, therefore, be (1) RNs – 33%, of which 50% can be substituted with ENs, and ENAs – 66%, of which 50% can be substituted with caregivers (RSA, 2010:63,64).

The mix of nursing skills can impact the administration of medication, as this is a professional function regulated by the SANC (SANC, 1984). Increasing lower categories of assistive nursing staff with lesser qualifications, to reduce nursing skill mix, can lead to lower quality of care and preventable deaths, according to a cross-sectional study done in Europe (Aiken, Sloane, Griffiths *et al.*, 2017:559–568). Although this study excluded nursing homes, it included 30 acute care hospitals in seven countries, namely Belgium, Switzerland, Spain, Finland, Ireland, and England. The researchers found that by reducing the number of professional nurses with 10%, it was associated with a 12% increased chance of death of patients. In their sample, there were on average six nursing staff members (four RNs and two nurse assistants) providing care to 25 patients. When reducing the number of RNs from four to three, substituting the position with a nurse assistant, they found a 21% increase in the odds of mortality (Aiken *et al.*, 2017:559–568).

In contrast with the study done by Aiken *et al.* (2017:559–568), a systematic review on the impact that nursing staffing has on the quality of care in nursing homes found no relationship between quality of care and nurse staffing. The authors concluded that even with higher levels of staffing, the quality of care can either increase or decrease. The reviewers included 18 quantitative longitudinal studies, and six of these studies specifically scrutinised the association between staff levels and process-related resident outcomes. Although higher staff levels do not seem to make a difference in the quality of care, it is interesting to note that three studies indicated better outcomes when increasing the total of nursing assistants. It must be noted that this systematic review focused on the quality of care, including all activities of daily living, and not the medication management process per se (Backhaus, Verbeek, Van Rossum *et al.*, 2014:383–393).

Within the organisational structure, vague job descriptions can also lead to medication administration errors as they can fail to guide nursing staff (Dilles *et al.*, 2011:171–180; Metsälä & Vaherkoski, 2014:12–28; Tshiamo *et al.*, 2015:18–23). When job descriptions are vague, nurses are unsure of what their responsibilities are, which could account for the 25% of nurses that indicated that monitoring side effects of medication is not part of their job description (Dilles *et al.*, 2011:171–180).

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) is an independent body in the United States consisting of 27 national organisations. The objectives of the NCCMERP are to increase the reporting of medication errors and to promote strategies aiming to prevent errors (NCCMERP, 2020). According to this body, reporting of medication errors is influenced by, first, the different definitions used for medication errors, which leave organisations open to interpret errors differently. As a result, some organisations will only report actual errors that harmed patients, and not potential errors. Secondly, staff working at organisations that facilitate a culture that is not punitive will probably conceal errors less and report more. Thirdly, when organisations rely on voluntary reporting versus using active detecting systems, such as a review of records, underreporting can occur (NCCMERP, 2020).

Although a reporting system should be in place, in various instances multiple studies found that systems were inadequate or not in place. Limited reporting was eminent, mainly due to a blaming culture where nurses fear punishment when they do report mistakes (Al-Jumaili & Doucette, 2017:420–488; Ferrah *et al.*, 2017:433–442; Tshiamo *et al.*, 2015:8–23). Supporting this tendency is the findings from the study done by Ellis *et al.* (2012:128-149) where the nurses stated that to prevent their managers from lodging a report against them, they would rather pre-pour medication as this saved time during the medication rounds. They admitted to disguising medication in fruit juice for residents who had difficulties swallowing and to prevent residents from spitting out their medication. Disguising medication in fruit juice was also used for residents who were cognitively impaired, got argumentative, and refuse their medicines. Thus, by disguising the medication, residents could still receive their medication, the nurses would be to complete a medication round in time, thus avoiding their managers from lodging a report against them (Ellis, Kaasalainen, Baxter *et al.*, 2012:128–149).

A study was done in 2011 (published in 2012) in three residential aged care facilities in Sydney, Australia on medication incident reporting, and they included 23 semi-structured interviews and 62 hours of observation sessions. Staff interviewed included nurses, service staff, and doctors involved in direct medication management. The facilities used either voluntary or mandatory error reporting systems. The results indicated a lack of using the correct forms in facilities to identify the origin of causes of medication errors, and a lack of overlapping of information exchange, which hinders a multidisciplinary approach in the management of medication incidents (Tariq, Georgiou & Westbrook, 2012:1–67).

2.4 PROCESS MEASURES

Process measures show the way processes and procedures contribute towards reaching anticipated outcomes. Therefore, it encompasses all practices relating to the standard of care. These measures are important in quality improvement as it determines if processes or systems have been properly applied. Therefore, these measures are an important link between structures (input) and outcomes (Donabedian, 2005:691–729). The backbone of process measures explored in this literature review is the relevant legislation, policies, norms and standards, the medication administration process guidelines, and the use of technology in medication administration.

2.4.1 International and national legislation, and medication administration policies

Insufficient policies to guide nurses can lead to medication errors, (Metsälä & Vaherkoski, 2014:12–28; Tshiamo *et al.*, 2015:18–23). Therefore, the researcher also explored this variable, to determine if the selected residential facilities for older persons had indeed policies for nurses, as well as how often they were required to read the medication policies. As an agency of the United Nations, the World Health Organization (WHO) coordinates international public health and policies. As such, the WHO makes recommendations to international communities to formulate policies, including for medicine. In a report on the world medicines situation (WHO, 2011), the WHO addressed the issue of polypharmacy and the need for tailored pharmaceutical programmes for the elderly. Consequently, the WHO strongly suggest regulations to include people over 70 years of age in clinical trials (WHO, 2011:11). The WHO's publication on the role of pharmacovigilance centres discusses in broad the prevention strategies needed for medication errors, such as proactive assessments of possible preventions of adverse drug reactions, incident reporting systems, and analyses of reports (WHO, 2014). Also, the WHO launched their third WHO Global Patient Safety Challenge in 2017, titled "Medication Without Harm" (WHO, 2019a). The goal is to decrease medication-related harm worldwide by 50% over the next five years. As part of the initiative, the WHO highlights three key areas, namely medication safety in polypharmacy, high-risk situations, and transitions of care. Within this, the focus is on the prescribing, dispensing, administering, and monitoring of medication, and improvements in each phase (WHO, 2019a).

In conjunction with the drive of the WHO, three other international organisations also strive to improve medical practices. Firstly, the International Medication Safety Network (IMSN), with

members from government agencies, scientific societies, and patient safety organisations, has the objective to promote centres for safe medication practices. This includes reporting programmes for medication errors, all to reduce unnecessary harms from the use of medicine. With a current membership of 25 countries, such as the United States and the United Kingdom, as well as the WHO, it is a resource to guide nursing practitioners as to best medical practices. Regrettably, South Africa is not yet a member (IMSN, 2020).

Secondly, the Agency for Healthcare Research and Quality (AHRQ) in the United States is a federal agency working within the US Department of Health and Human Services to improve the quality and safety of care. Although not a legislative body or policymaker, the AHRQ assists policymakers in the US by providing evidence-based research. For instance, they advised on the importance of using universal operational definitions for the classification of medication administration errors, as some errors are not reported due to the different classification systems used by different countries (AHRQ, 2019).

Thirdly, the Institute for Safe Medication Practices (ISMP) is a patient safety organisation with the main aim of preventing medication errors globally. As a non-profit organisation, this institute focuses on creating awareness for safe medicine practices and research and in doing so, makes a variety of resources and tools available to guide healthcare practitioners to prevent medication errors. For example, the ISMP sent out an alert in 2018 on 621 events that involved the splitting of oral medications to allow for easier swallowing. This resulted in medication errors of overdose or administering an extra dose. Of these events, 56% involved patients over 65 years (ISMP, 2020).

Within the South African context, specific legislation with direct relevancy to nurses working in residential facilities for older persons includes the National Health Act 61 of 2003, Older Persons Act 13 of 2006, and the Constitution of South Africa (RSA, 1996, 2003, 2006). The Medicines and Related Substances Act 101 of 1965 regulates the registration of medicines and scheduled substances. This includes, for instance, provision for the use of approved labels on medicines, for licensing persons to dispense medicines, the keeping of registers, and the control of scheduled substances (RSA, 1965). This act also mandated the South African National Department of Health in Section 1 (C) and 34A (1) and (2) to exercise the duties or functions of the Act in hospitals and nursing homes (RSA, 1965). Subsequently, the South African National Department of Health published the document “Medication Management in Residential facilities for Older Persons” in November 2011 to provide guidelines to maintain, improve, and regulate medication management

practices in residential facilities for older persons (Department of Health, 2011b). These guidelines include detailed instructions for policies on the ordering, receiving, storage, administration, and record-keeping of medication, as well as the review of medication, required in-service training, and management of emergency medications (Department of Health, 2011b). Also, the South African National Department of Health (2011) prescribes core standards for health establishments in South Africa, to set a standard for the monitoring of quality care against service delivery (Department of Health, 2011a). Applicable to this study would be the standards to ensure quality nursing and clinical care to reduce unintended harm to residents, including risk management and management of medico-legal incidents.

Concerning national legislation, the SANC as a regulatory body determines the scope of practice for nurses (SANC, 1984). Chapter 2 (C) of Regulation 2598 of 1984, Regulations Relating to the Scope of Practice of Persons Who are Registered or Enrolled under the Nursing Act, 1978 as amended, stipulates that the RN may administer medicine to patients, including the monitoring of their reaction to medication and treatment. Chapter 5 (C) of Regulation 2598 of 1984 as amended, allows the EN to execute a nursing plan for the patient, and observe patients' reactions to medication and treatment, under the direct or indirect supervision of the RN. The scope of practice of the ENA is contained in Chapter 6 of Regulation 2598 of 1984 as amended and does not include any reference to medicines (SANC, 1984). In contrast to the South African ENAs' scope of practice, nurse assistants are allowed by legislation to administer medication to patients in other countries, such as Belgium (Dilles *et al.*, 2011:171–180).

Apart from legislation, all institutions should have medication policies to guide nurses, which covers all five phases of the medication process (Lindblad, Flink & Ekstedt, 2017:598; Vogelsmeier, 2011:49–55). In South Africa, legislation, and regulations on all aspects of medication procurement, distribution, prescribing, dispensing and use of drugs, is contained in a South African National Drug Policy that applies to all health establishments (Department of Health, 1996). The National Drug Policy also indicates that priority training for nurses must include in-service training on, among others: standard treatment guidelines, essential drugs, rational use of drugs, and management information systems (Department of Health, 1996). A systematic review of studies done in North America determined the frequency of medication errors resulting in hospitalisation and death. The focus was on adverse events from medication errors, including 11 peer-reviewed published studies between January 2000 and October 2015 in English, French, German and Spanish. Adverse drug events were present in 1.2 to 7.3 of every 100 residents, and 16% to 27% of residents were involved in medication errors. The researchers found that faulty

policies can contribute to as much as 6% of these medication errors (Ferrah *et al.*, 2017:433–442).

In the Western Cape, the Department of Social Development prescribes the minimum health policies for residential facilities for older persons to include in their policy manuals of frail care centres (Department of Social Development, 2015). Thus, prescribed policies include all medication policies set out by the National Department of Health, including a policy on the ordering of medication, medication administration, and a policy to report medication errors. An exception is that the National Department of Health allows the administration of medication in dose containers filled daily, or up to three days at a time (decanting of medication), whilst the Department of Social Development stipulates that no decanting is allowed (Department of Health, 2011b; Department of Social Development, 2015). In this study, the practice of decanting will be explored and discussed in Chapter Four (4) and Chapter Five (5).

In summary, the literature supports the fact that international, national, and in-house medication policies are essential to guide nurses in the correct management of the medication process. The following section will explore the different phases in the medication management process.

2.4.2 The medication management process

The medication management process is complex and best described by dividing it into five areas. These include prescribing, usually done by a doctor (evaluating the resident's condition and choosing the right medication), transcribing done by nurses (writing down the doctor's prescription and sending the order to the pharmacy), dispensing (pharmacist checking and confirming the accuracy of the order, preparing the order and sending it to the facility), administering (reviewing the accuracy of the order, checking for allergies and possible drug interactions, assessing the resident and giving it to the resident) and monitoring (assessing the response to medication and documentation of the process) (Ferrah *et al.*, 2017:433–442).

In the prescribing phase, one of the factors that complicate medication management in nursing homes is the fact that prescribing doctors are not on-site, which can be problematic where communication between team members are concerned (Ferrah *et al.*, 2017:433–442). This is also the case in South Africa, and also, residents are only required to see a physician six-monthly to renew a medication script (RSA, 2006). A second challenge in the prescribing phase listed by both Metsälä and Vaherkoski (2014:12–28) and Dilles *et al.* (2011:171–180) is the illegible handwriting of doctors, which could lead to MEs. Illegible handwriting and the deciphering thereof

will be explored in this research study, to determine if this is a factor associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, WCP.

After the doctors prescribed medication, transcription takes place when nurses receive these medications. Transcribing errors appear to be the highest contributors to errors, especially by licensed practical nurses working under the direct supervision of RNs. The least errors occurred in the dispensing phase, where pharmacists prepared the medication and delivered it to the facilities (Ferrah *et al.*, 2017:433–442).

In identifying barriers that nurses experience in the management of medication, a study in Belgium made use of an expert meeting where 12 charge nurses from six randomly selected nursing homes compiled a list of 30 barriers. Afterwards, 246 nurses and 270 assistant nurses in 20 nursing homes completed the survey, rating the relevance of the 30 barriers on a scale from one to 10 (Dilles *et al.*, 2011:171–180). The focus was on three stages of the medication process, namely preparation, administration, and monitoring of medication. The barriers were categorised as nurse-related (lack of pharmacology knowledge, lack of motivation and not feeling responsible for specific tasks), organisational barriers (work pressure, staff shortage, interruptions, insufficient guidelines), interdisciplinary barriers (bad handwriting, lack of communication) and patient-related barriers (the right to refuse medication, limited mental or intellectual capacities, multifaceted pathologies). The findings of the study indicated that 40% of the nurses and nurse assistants scored interruptions during the preparation of medication higher than seven (a strong barrier). The second strongest barrier, double-checking medication before administration due to limited time, received a 30% score higher than seven by both groups. However, in monitoring side effects, there was a difference in responses, as nurse assistants indicated the lack of knowledge a greater barrier than interdisciplinary communication, as opposed to the rating as a stronger barrier to the nurses. From the 30 barriers listed, 20% of the nurses indicated that at least 15 barriers were highly relevant. A strength of the study was the exploration of all the barriers listed, not only those leading to medication errors (Dilles *et al.*, 2011:171–180).

A further qualitative description study done in two long-term facilities in Canada in 2012 had the purpose of exploring the perspective of RNs and registered practical nurses on the medication management process (Ellis *et al.*, 2012:128–149). The authors included 22 RNs forming four focus groups—a focus group for RNs and registered practical nurses per facility. The authors compared the medication management process to a race, including preparation for the race

(enough information about the resident, diagnoses, needs, knowing the medication brands, appearances of medicines and working with other team members), running the race (administering the medication, time constraints) and finishing the race (assessment, evaluation, and documentation). The participants identified time constraints and extreme workload as the biggest challenges that influence all the stages of the medication process. It appears to be a concern to the nurses that to finish on time and prevent the filing of a medication-error report against them, they had to take shortcuts. This resulted in disguising medicine in the juice to prevent refusal by residents, or pre-pour medication, against institutional policies. Other barriers listed are a lack of knowledge of medication, managers not being considered as resources, polypharmacy, interruptions, and distractions during medicine rounds, unnecessary amounts of documentation and the fact that they felt they had little autonomy in the process (Ellis *et al.*, 2012:128–149).

An observational study in two long-term facilities in Australia supports the notion that lengthy medication rounds can be a barrier to nurses. Medication rounds can take up to 2.5 to 4.5 hours per day, which can construe of 37.5% of the nurses' time in an eight-hour shift. The findings of the study indicated that 52% of the residents took six to 10 tablets per day, and 67% of the residents needed help from nurses to take their tablets. These lengthy medication rounds could compromise safe medication administration to older persons (Qian *et al.*, 2015:427–434). To determine if lengthy medication rounds are also a factor associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, WCP, the length of morning, afternoon and evening medication rounds as perceived by participants will be explored.

As seen in the reviewed literature, all five phases of the complex medication management process have unique challenges, but the development and use of different techniques and tools can help nurses in the different phases. The next section explores the literature on tools and technology, particularly with the focus on the prevention of medication errors.

2.4.3 Use of technology in medication administration

Technology and tools are often used in current information or the digital age. This includes the use of mobile devices and computers in medication management. An article published in the *Pharmacy and Therapeutics Journal* in 2014 examined the use of mobile devices and the available software applications by healthcare professionals (Ventola, 2014:356–364). The author listed the use as, among others, for gaining clinical information, e-learning, accessing literature,

monitoring of residents' health, video calling, and drug references to check possible drug interactions. As such, this study by Ventola (2014:356–364) suggests that mobile devices and software applications could also be useful in the residential facilities for older persons in the WCP, especially to check possible drug interactions. Therefore, this variable was explored in this research study. Additional challenges identified in this study were the protection of personal data of patients and the proper integration of devices in the workplace (Ventola, 2014:356–364). A mixed-method study with semi-structured interviews at a Canadian medical school supports the findings of this article (Wallace, Clark & White, 2012:1–7). Of the respondents, 34% conveyed their concern for the protection of patient confidentiality. Another concern listed was the boundaries between personal and professional life, where 60% of the student participants indicated that it would be beneficial to have a policy on smartphone usage to address compromised professional behaviour (Wallace *et al.*, 2012:1–7). Although healthcare workers still seem reluctant to use software applications in practice, it can be a valuable tool to assure the quality and safety of residents (Ventola, 2014:356–364).

Also, research has been done on different electronic safety systems, especially systems that use software for the identification of patients with bar code scanners before administering medication. Healthcare facilities using this system need a mobile computer with Wi-Fi, a bar code reader and printer. Some of these bar code medication administration systems (BCMA) also automatically record the medication given in electronic medication administration records. Some BCMA systems also have a built-in warning system to prevent errors, such as a warning that is issued when medication is administered late, or an attempt is made to administer an incorrect dose. The BCMA is considered a solution for preventing a violation of the "five rights" of medication (AHRQ, 2020). The findings of the research done by the AHRQ (2020), suggests that the use of the BCMA can also be a possible solution to prevent the violation of the "five rights" of medication in residential facilities for older persons in the WCP. As this literature indicates the use of mobile computers, the researcher explored the use of computers in the workplace in this research study.

Two studies included the use of tools in detecting errors and found them helpful for nurses and residents. Firstly, a cohort study that stretched over three months in 2011, included 345 residents, and 213 220 medication administrative episodes related to the incidence of medication errors in nine residential care homes and four nursing homes in the South West, Midlands and North West of England (Szczepura *et al.*, 2011:1–10). The researchers used a BCMA in real-life situations to show attempts to administer medication incorrectly. Before the use of the BCMA hand-held device, the pharmacy uploaded data from the residents and then used it by scanning the individual

resident's bar code with the device. The device evaluated if it were the correct resident, medication, date, time, dose, and quantity, and would send a warning if an error was about to occur. With the device sending an alert, prevention of 2 289 (1.2%) possible incorrect efforts occurred, identifying the incorrect efforts as administering at incorrect times and days, to the wrong resident and after discontinuation of the medication. The two errors considered possibly the most serious (described as near-misses) was administering to the wrong resident and attempting administration after discontinuation of the medication. Exposure of 52% of residents to one or both errors over the three months occurred. A concern mentioned by the researchers was that residents rarely attempted to intervene in the faulty attempts, thus increasing the risk to their safety. This indicated that tools can be valuable in detecting potential errors before it happens, provided that it is correctly programmed and used correctly by staff (Szczepura *et al.*, 2011:1–10).

A second study examined the impact that the BCMA has on medication errors when used in conjunction with a computerised prescriber order entry, and the automated dispensing device or ADD. Both are also referred to as closed-loop medication administration systems (Shah, Lo, Babich *et al.*, 2016:394–402). The Canadian researchers did a systematic review of published articles between 1992 and 2015, focusing on timing and non-timing administration errors, transcription, and total medication errors. As most articles only focused on either just the BCMA or a singular system, the researchers selected only five articles for their final review. These included four studies done in the United States and one in the United Kingdom. Their results show that the BCMA when used with complementary safety technology systems such as the computerised prescriber order entry and ADD, can reduce:

- non-timing administration errors from 11.5% to 6.8%.
- wrong medications decreased from 1% to 0.4%.
- wrong dose from 2.0% to 1.1%.
- wrong route from 0.3% to 0.1%.
- documentation errors from 2.9% to 0.6%; and
- potential adverse drug events from 3.1% to 1.6%.

However, the studies included in this systematic review did not find any significant effect on wrong time errors (Shah *et al.*, 2016:394–402).

In contrast to the promotion of utilising technology and tools to assist in preventing errors, electronic systems for record-keeping versus handwritten records were found to make no

difference in reducing medication errors (Ferrah *et al.*, 2017:433–442). Although various other tools are also available to help nurses in detecting possible errors, such as the ADE trigger tool and software like Pharma Nurse, studies indicated that it is underutilised (Al-Jumaili & Doucette, 2017:470–488). Other authors emphasised the importance of promoting the continuous professional development of nurses, especially in the use of technology, such as the internet (Tshiamo *et al.*, 2015:18–23).

Another tool used to simplify the administration of chronic medication is automated multi-dose drug-dispensing systems (MDD). It involves a registered pharmacist repacking prescribed medicines from the original manufacturers' containers together into a different container according to the agreed quantities (Bardage, Ekedahl & Ring, 2014:1–10). Regulations for the repacking of medication varies between countries. For example, the United States uses automated MDDs exclusively in settings that accommodate elderly people long-term, and the blister packs must be pre-approved by the Food and Drug Administration. Sweden, however, uses plastic packaging as this is according to the European Union guidelines (Conn, Ruppar, Chan *et al*., 2015:145–160). In South Africa, automated dispensing units (ADUs) are available for the repacking of prescribed medicines from the original manufacturers' containers together into a different container (South African Pharmacy Council, 2008). The document: "The Good Pharmacy Practice in South Africa" contains the Code of Conduct for pharmacists and the rules on good pharmacy practice (South African Pharmacy Council, 2008). Section 1.9 in the above-mentioned document refers to foil or blister packs, and that a pharmacist may only remove medication from original containers to create a bulk dispensing pack for each patient. This section also addresses the minimum standards relating to automated dispensing units. This includes, among others, the storage and operation of the ADUs, the oversight that a pharmacist must provide, the avoidance of cross-contamination, and keeping of records. However, there are no prescribed packaging materials (South African Pharmacy Council, 2008:55–58). However, from the researcher's experience the use of bulk dispensing packs is still a new concept in the residential facilities for older persons in the WCP.

A study done in Sweden also illustrates the use of automated dispensing units. The authors investigated healthcare professionals' experience of this automated multi-dose drug dispensing system. They obtained data via online questionnaires, including 223 questionnaires from physicians, 215 from nurses, and 915 from assistant nurses. The main findings were that it reduced duplication of medication, assists with correct dosages, and taking medication at the right times. More than 80% of the nurses and 70% of assistant nurses indicated that the automated

multi-dose drug dispensing systems was suitable for patients that took multiple chronic medications. Of the physicians, 66% concluded that automated multi-dose drug dispensing systems are mainly used for staff convenience, and 77% of nurses and 60% of assistant nurses collaborated with this statement (Bardage *et al.*, 2014:1–10). Based on these findings by Bardage *et al*. (2014:1–10), the researcher included in the data collection process in this study, the use of the automated dispensing units in the residential facilities for older persons. The aim was to identify factors associated with safe medication administration in the specified residential facilities for older persons within the Metro-North, WCP.

Process measures link structural measures and outcomes (Donabedian, 2005:691–729). One could, therefore, deduce that available policies, the implementation of medication practices, and technology when administering medications are closely associated with available resources and the outcomes on resident care.

2.5 OUTCOME MEASURES

Outcomes measure the effect of care on patients, while technical outcomes measure the reduction in mortality, infections, injury, and adverse events. Therefore, outcome measures confirm the excellence and efficiency of the healthcare provided (Donabedian, 2005:691–729). The structure and process measures, therefore, have an impact on the health status of residents. The literature reviewed included articles on the impact of medication errors on residents' health status as well as the cost implications of medication errors on the health sector and residents.

2.5.1 Changes to residents' health status

According to Grove and Gray (2019:453), a review is done of the effect of evidence-based practices by measuring patient outcomes. The indicator to decide the outcome of adherence to safe medication administration processes is medication errors. This includes medication error rates and the types of errors (Ferrah *et al.*, 2017:433–442). This comprises a risk analysis of medication-related incidences to decide if residents received the acceptable standard of care, experienced harm in the process of medication administration, or even death (ACT Academy, 2018).

According to a systematic review and meta-analysis of observational studies (Oscanoa, Lizaraso & Carvajal, 2017:759–770), adverse drug events lead to one in 10 patients over 60 years, or 8.7%, being admitted to hospitals. The authors included 42 articles from January 1988 to August 2015, in 21 different countries, including a prospective cross-sectional study in South Africa, albeit

in 2006. Medications most related to admissions are nonsteroidal anti-inflammatory drugs (NSAIDs), indicating an occurrence between 2.5% to 33.3% in 13 of the studies. Patients suffered from coronary events, renal failure, upper gastrointestinal bleeding, and hypertension as a result. The eight studies, including beta-blockers, indicated clinical symptoms such as bradycardia and hypotension between 1% and 66.7%. The researchers suggested that some side effects are possibly preventable, such as hypotension due to anti-hypertensive medications, and hypoglycemia due to antidiabetic medications (Oscanoa *et al.*, 2017:759–770).

According to Ferrah *et al.* (2017;433–442), complex drug regimens and multiple medications, such as antipsychotics, antidiabetics, sedatives, anticoagulants and diuretics, appeared to be the highest contributors involved in errors. Identifying residents with cognitive impairment and women older than 75 years as being the higher risk group, the most common error was administering the wrong dose, resulting in mild to severe harm in 32.9% of cases. The authors concluded that human errors contributed to 70% of all medication errors, specifically distraction. Key staff members involved in medication errors are the licensed practical nurses working under the RNs direct supervision. Although not causing serious harm to residents, this category of nurses was involved in 67% of all medication errors. When compared to mild harm caused to residents, another included study found no association between serious risks to residents and the qualification of staff (Ferrah *et al.*, 2017:433–442).

A Cochrane systematic review of eight articles in 2013, on interventions to optimise prescribing for older people in care homes, identified their primary outcomes as adverse drug events, hospital admissions, and mortality. Secondary outcomes were quality of life, medication appropriateness, and medication cost (Alldred, Raynor, Hughes *et al.*, 2013:1–53). The authors found no evidence that the interventions to optimise prescribing affected adverse drug events, hospital admissions or mortality as a primary outcome. For instance: hospital admissions or inpatient days were lower in one study, which was 0.55 in the intervention group versus 1.26 in the control group. One study indicated a reduction in hospital readmissions and emergency room visits, with a relative risk ratio of 0.38. Concerning mortality, two studies indicated fewer deaths in the intervention groups, but then two studies showed no difference in mortality between the control and intervention groups. None of the studies measured quality of life. However, interventions did lead to a resolve of medication-related problems when it was identified (Alldred *et al.*, 2013:1–53). In 2016, the authors reviewed their 2013 publication, adding four more studies (Alldred, Kennedy, Hughes *et al.,* 2016:1–60*)*. Two of these studies examined the quality of life, one finding no physical or mental variations. One study indicated a slower decline in residents' quality of life when

prescribing is optimised, especially in breathing, speech, and sleeping patterns. The authors concluded that the inclusion of multidisciplinary team members when reviewing residents' medications are significant in optimising the residents' medication regimes (Alldred *et al.*, 2016:1–60).

In 2011, authors did a prospective cohort study including 345 residents in nine residential care homes and four nursing homes in South West, Midlands, and North West of England (Szczepura *et al.*, 2011:1–10). They highlighted the implications for safe medication administration when using the bar code medication administration (BCMA) system in real-life situations, to show attempts to administer medication incorrectly. Before the use of the BCMA hand-held device, the pharmacy uploaded data from the residents and then used it by scanning the individual resident's bar code with the device. The device evaluated if it were the correct resident, medication, date, time, dose, and quantity, and would send a warning if an error were about to occur. The residents received in total 188 249 medications at different times over three months, with the 91 residents from nursing homes each receiving nine different medications, leading to a total of 24 570 medication episodes per month in nursing homes alone. With the device sending an alert, prevention of 2289 (1.2%) possible incorrect efforts occurred, identifying the incorrect efforts as administering at incorrect times and days, to the wrong resident and after discontinuation of the medication. The two errors (described as near-misses) considered possibly the most serious were administering to the wrong resident and attempting administration after discontinuation of the medication. Exposure of 52% of residents to one or both errors over the three months occurred. A concern mentioned by the researchers was that residents rarely attempted to intervene in the faulty attempts, thus increasing the risk to their safety (Szczepura *et al.*, 2011:1–10). The limitations identified by the authors were that the medication errors were not subjected to valuing as there were no agreed norms, and only administration of medication was included, not other factors such as prescribing (Szczepura *et al.*, 2011:1–10).

It is clear in the reviewed literature that medication error types and rates can have an impact on residents' health status. Besides, medication errors can also have an impact on organisations. A discussion of this includes cost implications, the legal implications of medication errors on organisations, and the effect on nurses.

2.5.2 Implications of medication errors for facilities

It is human for nurses to make mistakes, but medication errors can cause harm or the death of residents (Kohn *et al.*, 2000:20). Apart from the impact on residents, this can have personal, professional, and organisational consequences. According to Shah *et al.* (2016:394–402), when a patient experiences an adverse event because of a medication error, the length of hospitalisation increases with 4.6 days, with a cost of $4 585 per event (about R71 818.06). Affirming this, Ferrah *et al.* (2017:433–442) estimated the annual cost of adverse drug events from medication errors on $7.6 billion (about R 119 billion) in the United States. The systematic review done by Alldred *et al.* (2016:1–60) on interventions to optimise prescribing for older people in care homes indicates in their findings that one study reported a reduction in medicine cost of £27.47 (about R551.69) per resident over four months, whilst an Australian study reported a saving of AUS$ 64 (about R654.28) per resident per year. One study concluded that there was no difference in cost of hospitalisation over 28 day days (Alldred *et al.*, 2016:1–60).

The indirect cost of medication errors can be in the form of litigation costs. Over the past century, medical negligence and malpractice lawsuits increased substantially worldwide, and South Africa shows the same tendencies. According to the Medical Protection Society, negligence and malpractice lawsuits claims increased in two years with 132% against all categories of healthcare providers in the RSA (Medical Protection Society, 2020). The South African Law Reform Commission projected the cost for contingent liabilities for medical malpractice at about 40 billion rands against the Department of Health for 2017 (South African Law Reform Commission, 2017:17). The most important reasons for the increase in claims are stated among others as an increase in life expectancy, a lower standard of healthcare delivered, unprofessionalism of healthcare providers, and the improvement in patient rights awareness (Pienaar, 2016:6–7).

As nurses are especially exposed to negligence claims due to prolonged time spent with patients and the nature of direct care delivery, they should have a detailed understanding of applicable laws that influence their practice (Le-Roux-Kemp, 2014:1). Due to the trust relationship formed on admission, residents are owed a duty of care. Thus, residents could expect adherence to the practice standard on medication administration, which emphasises the “five rights”: the right dose, route, time, drug and the right patient (Grissinger, 2010:542). Already, the statistics from the SANC indicates 1 043 cases of professional misconduct against nurses from 2003 to 2016 (SANC, 2019).

Apart from negligence claims, vicarious liability also comes into play. Vicarious liability refers to unlawful conduct by a first person, and a second person is also liable for the first person's actions. The second person is usually the employer, who can be held liable according to common law for the conduct of the employee's actions (Dhai & McQuoid-Mason, 2011:94). As an example: in *March v Arnot*, after the RN administered the wrong medication, she followed the correct procedure for rectifying the mistake, but the relevant record-keeping was entered four months after the resident's death. This resulted in punitive damages for the facility as they failed to provide safety precautions, the necessary training, and did not address medication errors at quarterly quality assurance meetings (March v Arnot Ogden Med. Ctr., 2012).

Implications of medication errors for residential facilities for older persons can be multiple. Not only is there harm to humans, but this also has direct and indirect cost implications.

2.6. SUMMARY

The literature that was reviewed and synthesised in this chapter provides a comprehensive overview of the factors associated with safe medication administration, as discussed under each of the Donabedian's Quality of Structure-Process-Outcome Quality of Care Model components above (Donabedian, 2005:691–729). Although thoroughly researched in other healthcare settings, there are substantial gaps in our knowledge of what is construed as safe medication practices in residential facilities for older persons, especially within the Metro-North, WCP.

As structural measures, the care delivery setting was residential facilities for older persons and included the care recipient or older person. With increasing higher ages and weaker health status, the complex diagnoses frequently result in polypharmacy. Multiple authors indicated that this leads to increased risks of medication errors (Al-Jumaili & Doucette, 2017:470–488; Dagli & Sharma, 2014:1–2; Metsälä & Vaherkoski, 2014:12–28). Secondly, nurses as resources under structural measures have an impact on medication administration processes. Although the demography, qualifications, and competencies of nurses vary widely, the literature suggests that globally there is a constant demand for more nurses, given the ageing population. As a possible solution, Stanyon *et al.* (2017:582–588) suggest that it is important to identify vital competencies that can form the basis for curriculums for RNs who wish to work in the elderly care context. The last structure measure that was examined was the attributes of the organisation in which care provision takes place. Multiple challenges exist, such as complicated physical outlay of buildings, high noise levels, interruptions, and distractions when administering medications (Al-Jumaili & Doucette, 2018:1420–1427; Metsälä & Vaherkoski, 2014:12–28). As human error does occur,

various global initiatives encourage medication error reporting without a punitive approach (AHRQ, 2019; ISMP, 2011; NCCMERP, 2020). Despite these initiatives, the literature suggests that underreporting is evident, mainly due to blaming cultures.

The literature reviewed concerning the process measures included policies, the medication management process, and the use of technology in medication administration. Together, these process measures indicate how they contribute towards reaching the anticipated outcome, namely safe medication administration in residential facilities for older persons. From the literature, policies are essential to guide nurses in safe medication practices. Despite medication management being a time-consuming task for nurses, errors can lead to harm to residents or even death. The literature revealed a multitude of barriers that nurses face, such as illegible handwriting of doctors, transcribing errors, interruptions, lengthy medication rounds, and lack of knowledge (Dilles *et al.*, 2011:171–180; Ellis *et al.*, 2012:128–149; Ferrah *et al.*, 2017:433–442; Metsälä & Vaherkoski, 2014:12–28; Qian *et al.*, 2015:427–434). Apart from all the barriers that nurses face in medication administration, technology and tools are available to help nurses in this process. Studies including the use of a BCMA to detect medication errors before they occur have great value, according to the authors (Shah *et al.*, 2016:394–402; Szczepura *et al.*, 2011:1–10). However, it appears from the literature that nurses are still reluctant to use software applications in practice (Ventola, 2014:356–364). The implementation of automated dispensing units as a tool in medication administration in South Africa is recent, and only included in the document "The Good Pharmacy Practice in South Africa" in 2008. This possibly explains the lack of published studies in the local context.

Outcome measures that related to this literature review are those that affected residents and residential facilities. Changes to residents' health status due to medication errors can range from mild, moderate, and severe harm, and even to death. This increased hospitalisation by 4.6 days (Shah *et al.*, 2016:394–402). The study done by Ferrah *et al.* (2017:433–442) estimated the annual cost of adverse drug events from medication errors to be $7.6 billion (about R119 billion) in the United States. Also, the indirect cost of medication errors in the form of negligence claims can paralyse the healthcare sector. This is supported by the South African Law Reform Commission that projected the cost for contingent liabilities for medical malpractice at about 40 billion rands against the Department of Health for 2017 (South African Law Reform Commission, 2017).

The literature reviewed indicates a lack of research on the safe administration of medication in residential facilities for older persons in South Africa. Conduction of further studies in this field of nursing is important, especially to bridge the gap between available South African legislation and policies, and the challenges surrounding the implementation of safe medication administration in practice.

2.7. CONCLUSION

The researcher used the Donabedian's Quality of Structure-Process-Outcome Quality of Care Model to organise and review the literature relevant to safe medication administration in the elderly (Donabedian, 2005:691–729). Multiple diagnoses and polypharmacy provide challenges to nurses in terms of lengthy and complex medication rounds, facilitating medication errors. The literature also indicated that organisations with efficient medication policies, error reporting systems, and a non-punitive culture can encourage the reporting of medication errors. Also, technology could assist nurses in preventing medication errors that could lead to the harm and even death of residents. Following this literature review is Chapter Three (3), which provides an in-depth discussion of the research methodology used in this study, to identify factors associated with safe medication administration in residential facilities for older persons within the Metro-North, WCP.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 INTRODUCTION

The previous chapter (Chapter 2) provided a detailed overview of reviewed literature that is relevant to safe medication administration in the elderly. The literature was therefore organised according to Donabedian's Structure-Process-Outcome Quality of Care Model, which will be utilised to guide the research process (Donabedian, 2005:691–729). The focus of the literature review commenced based on the following: firstly, care delivery setting, nurse, and organisational resources, and lastly infrastructure. The second focus was on literature including process measures such as available policies, the medication management process, and the use of technology in medication administration. The third and last focus was on literature regarding outcome measures, such as the effect of medication errors on residents and residential facilities for older persons. Subsequently, this chapter includes an in-depth discussion of the research methodology used in this study to identify factors associated with safe medication administration in residential facilities for older persons within the Metro-North, WCP. This discussion includes the study setting, research design, population, sample, and data collection instrument. An explanation of how the researcher conducted the pilot test, collected data and ensured validity and reliability will follow. Lastly, an in-depth discussion of the process of data analysis that was applied in this study is provided.

3.2 AIM AND OBJECTIVES

This study aimed to determine the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, WCP.

The objectives of the study were to:

- RO.1. Determine the socio-biographical data related to nurses working in the specified residential facilities for older persons within the Metro-North, Western Cape Province.
- RO.2. Investigate the type of organisational resources and infrastructures in specified residential facilities for older persons within the Metro-North, Western Cape Province.

- RO.3. Identify the medication administration process followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, Western Cape Province.

- RO.4. Provide evidence of factors associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, Western Cape Province, as provided by the nurses.

3.3 STUDY SETTING

The researcher conducted the study in a natural uncontrolled environment, in 10 funded and 18 private residential facilities for older persons in the Metro-North, WCP, without manipulation of this setting. These residential facilities are situated in Bellville, Brooklyn, Cape Town, Durbanville, Elsies River, Epping, Goodwood, Milnerton, Parow, Pinelands, Vredehoek, and Welgelegen. All the facilities have a frail care centre to accommodate frail residents and are registered with the Department of Social Development under the Older Persons Act 13 of 2006 (RSA, 2006). The facilities are not identified in the final data analysis to protect their anonymity and confidentiality.

3.4 RESEARCH APPROACH

The purpose of this section is to indicate how the research was conducted by describing the research paradigm and research design.

3.4.1 Research paradigm

To decide which research design would be most appropriate for a study, the researcher must decide in advance on a research paradigm. A paradigm is a researcher's worldview, or philosophical way of thinking, and includes the interpretation of the data collected in the research. A paradigm includes four essential areas, namely epistemology, ontology, methodology, and axiology. The epistemology of the paradigm is concerned with the nature of knowledge, while ontology deals with the nature of reality. The methodology of the paradigm concerns the research design and approach used to collect and analyse the research data. The last essential area, axiology, involves the ethical issues and assessment of risk and how to minimise this risk and possible harm to participants (Kivunja & Kuyini, 2017:26–41).

According to Grove and Gray (2019:15), to evaluate which paradigm to follow, the researcher must measure the chosen approach against the above-mentioned essential areas. The research

paradigm followed in this study was quantitative or had a positivist approach. When measured against the epistemology of a positivist approach, this includes describing the knowledge in a systematic way to replicate the knowledge for a large group of people in other similar situations or settings, by deductive reasoning. Also, in a positivist approach, ontology operates on the assumption that the truth is absolute and that precise measurement of realities is possible (Grove & Gray, 2019:15). The methodology in a positivist paradigm requires the researcher to take an objective independent role where their values are set aside (Kivunja & Kuyini, 2017:26–41). This study complies with a quantitative approach, which requires the researcher to be objective, follow a structured approach and using questionnaires as a measurement method. It further allows the researcher to analyse numbers with statistical techniques to determine results (Grove & Gray, 2019:15).

3.4.2 Research design

Grove and Gray (2019:30,192) describe a non-experimental descriptive design as a research design to describe phenomena in real-life situations, or as they occur in the natural environment without any manipulation from the researcher. A cross-sectional design allows for the collection of data from various participants simultaneously, at one point in time (Grove & Gray, 2019:30,192). A non-experimental cross-sectional descriptive design was applied in this study, with a quantitative approach. The cross-sectional design was applied by collecting data regarding numerous different characteristics of participants with different levels of education, simultaneously (during the same time frame), and from both the funded and the private residential facilities for older persons. The aim was to gain a more complete understanding of the phenomenon as it occurs naturally in the residential facilities for older person, without manipulation by the researcher. The researcher chose a quantitative over a qualitative approach to enable quantifying of the problem to project the results to the broader population, which would not be possible in a qualitative approach. Also, the objective was to obtain data from a broader spectrum of participants rather than a more in-depth exploration of the variables. The rationale for choosing this design was because this allowed for objective exploration of the variables, which were the factors associated with safe medication administration as it occurred in the natural setting (residential facilities for older persons), without intervention by the researcher. Following data collection, was the examining of relationships between the constructs that had an impact on the processes of medication administration. It also included a description of the variables that provided valuable information for improving medication administration practices in residential facilities for older persons. By using questionnaires with a completion time of 20 minutes and

allowing participants to complete the questionnaires at home, this study design lends itself to minimising risks for participants of the study and allows for the generalisation of findings to a larger group in similar settings.

3.5 POPULATION AND SAMPLING

Before the research study, the researcher identified the population from which to generalise the study findings and then drew a sample from that population, as described below.

3.5.1 Population

Grove and Gray (2019:229) defines the **population** as a specific group of people who the researcher intends to study. In this study, the researcher selected nurses working in registered residential facilities for older persons in the Metro-North, WCP. The **target population** is described as the specific group of people that meet the inclusion criteria, and which the researcher intends to study (Grove & Gray, 2019:229; Polit & Beck, 2010:307). These included, for this study, the N=430 nurses working in all the 56 funded and private registered residential facilities for older persons in the Metro-North, WCP. Nurses included RNs, ENs and ENAs. In the 20 funded registered residential facilities for older persons in the Metro-North, WCP, were N=39 RNs, N=55 ENs, and N=65 ENAs, which amounts to a target population of N=159, as displayed in Chapter One (1), Table 1.1. The 36 private facilities included a target population of N=271, consisting of N=104 RNs, N=72 ENs, and N=95 ENAs, as seen in Chapter One (1), Table 1.2.

3.5.2 Sampling

After identifying the target population of the N=430 nurses working in all the 56 funded and private registered residential facilities for older persons in the Metro-North, WCP, the researcher selected a sample from the target population. The **sample** includes those members of the target population who comply with the list of essential characteristics predetermined by the researcher and who closely represent the population (Grove & Gray, 2019:230; Polit & Beck, 2010:307). In this instance, the sample was N=203, n=75 from funded facilities, and n=128 from private facilities, and the members of this sample had the essential predetermined characteristics and closely represented the target population. The sampling process was as described below.

The target population data was first submitted to a Stellenbosch Biostatics Unit statistician to assist with determining sample size. After consultation with the statistician, it was decided that sampling would be the most appropriate sampling method, as Grove and Gray (2019:239)

describes **stratified sampling** as selecting a sample from the target population that is essential for attaining representativeness of all levels of the known variables. Therefore, applying stratified sampling assisted with including equal samples from both the funded and private facilities. This divided the N=56 residential facilities for older persons in n=20 funded and n=36 private facilities, as displayed in Chapter One (1), Figure 1.3. After stratified sampling, which ensured that equal samples were obtained from both the funded and private facilities, the researcher, in consultation with the statistician, opted for a randomised sampling of each stratum.

Randomised sampling is a probability sampling method allowing each person in the target population to have an equal opportunity of inclusion in the study (Grove & Gray, 2019:237; Polit & Beck, 2010:313). The researcher opted for this sampling method to provide participants from both the funded and private facilities an equal opportunity for inclusion in the study. This consequently led to a selection of 50% of the funded facilities (n=10), and 50% of the private facilities (n=18), as illustrated in Chapter One (1), Figure 1.3. These sampling methods led to a sample size of N=203, n=75 from funded facilities, and n=128 from private facilities. The researcher did not apply further sampling to include all nurses in the randomly selected facilities.

3.5.3 Inclusion criteria

Inclusion criteria include the characteristics that the study participants must have to assist in meeting the goals of the study (Grove & Gray, 2019:230; Polit & Beck, 2010:306). The researcher first identified all registered residential facilities for older persons in the Metro-North area of the WCP, as registration at the Department of Social Development is mandatory in terms of the Older Persons Act 13 of 2006 (RSA, 2006). This included n=20 funded and n=36 private facilities. The inclusion criteria for this research study was all nurses (N=430), including RNs (N=143), ENs (N=127), and ENAs (N=160), working day and night shift full-time and part-time in the abovementioned registered facilities.

3.5.4 Exclusion criteria

Exclusion criteria apply to participants who meet the inclusion criteria but were specifically excluded due to specific reasons (Grove & Gray, 2019:230; Polit & Beck, 2010:306). The exclusion criteria for this research study was all nurses who were on annual vacation leave, sick leave, and nurses from personnel agencies, from the (N=430) working in registered residential facilities for older persons in the Metro-North area of the Western Cape Metropole. Excluding nurses on annual vacation leave and sick leave was based on the fact that they must be available

during the data collection time frame, while excluding nurses from personnel agencies was based on the understanding that they would most likely not be well acquainted with the medication administration procedures at the facilities due to short-term placement.

3.6 DATA COLLECTION INSTRUMENTATION

In descriptive quantitative research studies, questionnaires are frequently used to gather data from participants (Grove & Gray, 2019:281). A self-administered questionnaire, which is a self-report form where participants respond to formulated questions, can be distributed in person, via mail or electronically. In this way, the questionnaire can elicit either verbal, written or electronic responses from the participants. Although a questionnaire does not offer the participants opportunities to elaborate on responses or clarify questions, the presentation of questions in a consistent manner can limit bias (Grove & Gray, 2019:281; Polit & Beck, 2010:343). For this study, the researcher used a after obtaining written permission from Professor Ala Szczepura from the Warwick Medical School, the University of Warwick in the United Kingdom, who was the corresponding author from the research article “Medication administration errors for older people in long-term residential care” on 30 May 2019 (Szczepura *et al.*, 2011:1–10). The researcher adjusted the instrument after the pilot test to align it with the South African context, as described in Section 3.7.

The rationale for selecting this specific validated instrument was based on the research objectives, the literature search, and the experience and clinical knowledge of the researcher. The included questions support the constructs and variables based on the chosen theoretical framework. Although the instrument was in English, the accepted business language in the residential facilities for older persons in the WCP, participants were offered the services of a translator if needed in case of uncertainties or any questions, as well as the information flyer and consent forms in English, Afrikaans, and isiXhosa. The introductory paragraph of the original questionnaire included a space for the date and the participant code. The data collection questionnaire was divided into eight sections, from A to H. **Section A:** Socio-demographic included the home code and questions 2 to 12. **Section B** included institutional policies, medication training that participants received, medication supply in facilities, procedures followed during medication administration, and storage of medication, from questions 13 to 31. **Section C** dealt with how participants apply alterations to the MAR (Medication Administration Record/chart) and included questions 32 to 34. **Section D** addressed special circumstances in medication administration and comprised questions 35 to 45. **Section E** elicited answers on the use of

computers at home and work and comprised questions 46 to 52, while **Section F** addressed the use of mobile phones and comprised questions 53 to 55. **Section G** included questions 56 to 59, comprising participants' opinions on their current system of mediation ordering, supply, storage, and administration in terms of strengths, weaknesses, opportunities, and threats with reasons and a rating of each item. The last section, **Section H**, which related to job pressures experienced by participants, comprised question 60, with 26 subsections.

To identify what registered nurses, enrolled nurses, and assistant nurses perceived as factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, WCP, the development of the questionnaire was as follow:

- **Section A: Socio-demographics** consisted of the home code and 11 questions on participants' socio-demographics such as age and gender, job role, grade, qualifications, whether participants were in training for NVQ 3, their job title, how long they have been working in residential care (months) and in nursing home care (months), whether participants were full-time or part-time (with an indication of how many part-time hours/days per week), and lastly, by whom they were employed. It included one close-ended dichotomous question where participants could answer either "yes" or "no", as well as four multiple-choice questions where the participants could select one answer from a list varying from three to six options. Two of these multiple-choice questions were open-ended, where participants could select the option of "other" and write in an answer. The other questions were all open-ended and requested the participants to write an answer, such as their job title and how long they worked in residential care.
- **Section B: Institutional policies, medication training, medication supply, administration, and storage** consisted of 19 questions, no 13 to 31, on institutional policies, training, and knowledge of nurses. It also included questions on medication administration procedures such as dispensing of medication, medication rounds, and medication stock. Questions also elicited answers from participants on perceived causes and types of medication errors and the safety of medication systems. Grading of these questions was in terms of either "yes" or "no" (questions 21, 22 and 27), and also "yes", "no" or "not sure" (question 14). The multiple-choice questions included a list of between three and nine options to select from, and some of these multiple-choice questions were open-ended, where participants could select the option of "other" and write in an answer (questions 13, 15, 17, 18 and 30). Question 19 was a rating question, providing participants with a list of most common errors of medication accountability, and requesting

them to rate it from 1 to 7, with 1 being the most common and 7 being the least common. Also included was a five-point Likert scale (question 23) to indicate if participants know the purpose of medication that they give out. Participants could answer this question by indicating “always”, “almost always”, “sometimes”, “almost never” or “never”. Question 25 regarding the participants’ confidence on their current medication system was measured with a five-point Likert scale, from “very confident” (=1), “fairly confident” (=2), “neither confident nor lacking in confidence” (=3), “fairly lacking in confidence” (=4), and “no confidence” (=5). In question 29, a seven-point Likert scale was used to determine the participants’ ease with which they carry out a drug round on their own, varying from “not at ease at all” (=1) to “extremely at ease” (=7). Questions 16, 20, 24, 26, and 31 were open-ended questions, eliciting a written response from participants. Question 28 was a dichotomous question where participants could answer either “alone” or “with another person”, as a response to how they generally carry out the drug round.

- **Section C: Alterations to MAR (Medication Administration Record/chart)** consisted of three questions, no 32 to 34, relating to how participants made alterations on the medication administration record. Question 32 was a multiple-choice question where participants could select various options to indicate who is allowed to make changes to MAR sheets. Grading of questions 33 and 34 was in terms of “yes” or “no”.
- **Section D: Special circumstances in medication administration** consisted of 11 questions from 35 to 45 on special circumstances in medication administration. It included questions regarding checks performed before the administration of certain medication, the content, storage, checking, and refill of blister containers, missing medication under certain circumstances, and the management of mid-month dose changes. Furthermore, it included questions on the recording of administered medication and the sharing of medication between residents. Question 35 and 36 regarding the performing of pre-checks and training in pre-checks before medication administration had three subsections and grading of these questions was in terms of “yes” or “no”. Question 37 and 38 regarding where training in pre-checks before medication was received from and where the checks were noted, were multiple-choice questions including a list of options to select from, with one open-ended option, where participants could select “other” and write in an answer. Questions 39 contained 15 statements with subsections about assumptions of staff regarding medication administration, upon which participants could select “yes” or “no”, or “true” or “untrue”, “agree” or “disagree”. Statement 8, 10, and 12 included one subsection where participants had a multiple-choice, including an open-ended option, where

participants could select “other” and write in an answer. Statement 13 elicited a response from participants on whether they ever saw the practice of sharing some residents’ medicines. A four-point Likert scale measured these responses as “frequently” (=1), “fairly frequently” (=2), “rarely” (=3), or “never” (=4). Question 40 and 41 were multiple-choice questions including a list of options to select from, with one open-ended option, where participants could select “other” and write in an answer. Question 41 also had a subsection including a dichotomous question where participants could answer either “yes” or “no”, as was question 42. Question 43 elicited answers about participants’ attitude towards the introduction of a new medication system, and used a five-point Likert scale to measure options as “very keen” (=1), “fairly keen” (=2), “neither keen nor reluctant” (=3), “fairly reluctant” (=4), and “very reluctant” (=5). Questions 44 and 45 were multiple-choice questions, including open-ended options, where participants could select “other” and write in an answer.

- **Section E: Use of computers at home and work** consisted of seven questions, no 45 to 52, on the use of computers at home and work. To indicate how often participants used a computer at their house and work in question 46 and 48 respectively, a four-point Likert scale measured the options as “never” (=1), “daily (=2), “weekly” (=3), and “monthly” (=4). Questions 47 and 49 were multiple-choice questions, including open-ended options, where participants could select “other” and write in an answer. Question 50 was a dichotomous question where participants could answer either “yes” or “no”, to indicate if they had any formal training in computer use. Participants could rate their experience in terms of computer use in question 51, and these were measured according to an interval scale with the options of “inexperienced” (=0) to “experienced” (=10). Question 52 was similar to question 52, by also using an interval scale with the options of “confident” (=0) to “low confidence” (=10) to determine participants’ confidence in terms of computer use.
- **Section F: The use of mobile phones** consisted of three questions, no 53 to 55, on the use of mobile phones. Grading of questions 53 and 54 was in terms of “yes” or “no”, with question 55 a multiple-choice question, including an open-ended option, where participants could select “other” and write in an answer to what they use their mobile phone for.
- **Section G: SWOT analysis** included questions 56 to 59, consisting of participants’ opinion on their current system of mediation ordering, supply, storage, and administration in terms of strengths, weaknesses, opportunities, and threats. Participants were asked to provide reasons for each of their statements and a rating of each item. The rating of each

statement was done according to a five-point Likert scale, with “unimportant” =1, “fairly unimportant” = 2, “neither unimportant nor important” = 3, fairly important” = 4, and “very important” = 5.

- **Section H: Sources of job pressure.** The last section, Section H, which related to job pressures experienced by participants, consisted of question 60, with 26 subsections. The constructs are measured against statements such as “no pressure” (=1), “slight pressure” (=2), “moderate pressure” (=3), “considerable pressure” (=4), and “high pressure” (5).

3.7 PILOT TEST

Grove and Gray (2019:43) describe a pilot test as a small form of the planned study to refine the sampling process or measurement of variables. The original questionnaire was piloted in the United Kingdom in one care home, then used to collect data during a cohort study which included nine residential care homes and four nursing homes in the South West, Midlands, and North West of England. After the quantitative survey, the researchers conducted follow-up interviews with respondents (Szczepura *et al.*, 2011:1–10). After obtaining permission from author Professor Szczepura (Szczepura *et al.*, 2011:1–10), the researcher pre-tested the self-administered questionnaire. The goal was to determine the appropriateness for the South African context regarding relevancy, adequacy, and understandability to participants. Furthermore, the researcher included during the pre-test an assessment of the length, layout of the instrument, and if it was able to accurately measure the variables.

To select staff participants for the pilot test, the researcher first randomly selected two facilities. This included one facility from the 10 funded facilities and one private facility from the 18 private facilities from the Metro-North, WCP, that were excluded from the sample for the main study, as explained in Chapter One (1), Section 1.8.3. This was done by assigning a number from one to ten to the funded facilities and writing each number on equal size papers, folding, and placing it in a bowl. The papers were well mixed, and one paper selected, representing one funded facility. By repeating the process for the 18 private facilities by assigning a number from one to18 and writing each number on equal size papers, folding, and placing it in a bowl, and one private facility was selected. This resulted in a sample for pre-testing the instrument of n=15 in the funded facility, and n=10 in the private facility. The researcher did not apply further sampling for the pilot test to include all nurses in the randomly selected two facilities.

The pilot test took place on 12, 16, 18 and 19 March 2020 and included n=17 staff participants from two residential facilities for older persons in the Metro-North, WCP. The researcher held an

information session at each of the randomly selected two facilities as described above, to explain the goal of the pilot test and to ask for staff participants, including registered nurses, enrolled nurses and nurse assistants, who were willing to participate voluntarily. n=10 staff participants were from one funded, and n= 8 staff participants from one private facility, who chose to participate voluntarily. These staff participants met the inclusion criteria and were similar in characteristics as those in the main study. The return rate was 94.4% as 17 from 18 participants completed and returned the questionnaires.

During the pilot test, the researcher offered participants options to receive the participant information leaflet and consent form in either English, Afrikaans, or isiXhosa (Appendices 4,5, and 6). The goal of the pilot test was explained in English, the business language in the facilities. Ten participants at different time slots preferred to complete the questionnaires while the researcher waited. Observing where participants hesitated indicated that some questions could be confusing. The other respondents received self-seal envelopes and a predetermined collection date based on their work shifts. The feedback sessions provided valuable information as participants stated the need for the research topic in residential facilities for older persons.

The researcher captured the raw data from the pilot test on a Microsoft Excel spreadsheet by entering home codes and participants' numbers in the vertical columns and the variables horizontally representing the specific questions. The purpose was to pre-test the data analysis procedures to complete the research design. The following section is an overview of the findings of the pilot test that led to the alterations made to the questionnaire.

3.7.1 Pilot test findings and questionnaire alterations

This section indicates the most significant findings of the pilot test. Based on the response of the staff participants, the information gathered during the information sessions, and the observations by the researcher, the researcher made alterations to the data collection instrument, as indicated below, underneath the findings of each question.

Section A: Sociodemographics

Q1 (Question 1): The researcher allocated the home codes MNF1 to MNF9 to funded facilities and MNP1 to MNP8 to private facilities.

Alterations: To facilitate coding, the participants' codes, which was on the top of the original questionnaire, were inserted after the researcher received the completed questionnaires.

Q2: Participants indicated their age in real years, with n=2 not completing this section. The average age of n=15 was 48 years. Three of the 15 participants n=3 (20.0%) were over the age of 60 years. Although the sample size for this pilot test is only n=17, it appears to correlate with the statistics from the SANC stating that from the current workforce 19% of RNs are over 60 years, and 7% of both ENs and ENAs are over the age of 60 years (SANC, 2019).

Alterations: No alterations made but renumbered as question 2.

Table 3.1: Age of participants in years

Job titles	Participants (n)	Percentage (%)	Mean	Std. Deviation
RN	4	26.7	41.00	17.512
EN	6	40.0	50.00	13.161
ENA	5	33.3	51.20	11.454
Total = N	**15**	**100%**	**48.00**	**13.580**

Q4: ***At job role***, n=0 was care home managers, n=1 senior RGN, n=5 other RGNs, and n=0 care workers or senior care workers. n=5 drew a line through the options, n=7 wrote on questionnaires enrolled nurses, and n=4 wrote enrolled nurse assistants.

Alterations: The provided options were not suitable for the South African context, and thus changed to “nurse categories”, including senior RN, RN, EN and ENA. Renumbered: question 3.

Q5: n=5 participants did not complete this question on grade, n=6 wrote not applicable, n=3 wrote grade 12, and n=3 made comments to say, “do not understand”.

Alterations: This question elicited a variety of responses that were not relevant to the study, therefore, this question was removed.

Q6: n=3 did not complete the question about qualifications, n=0 indicated NVQ3 or NVQ4 or no qualification, n=3 wrote diploma in nursing, n=2 RGN level 1, 1 NVQ 2, n=4 wrote 2-year certificate as an enrolled nurse, and n=4 wrote 1-year certificate as an enrolled nurse assistant.

Alterations: Again, the National Vocational Qualifications (NVQ) are relevant to the United Kingdom, and not suitable for the South African context. Adjustments were made to incorporate levels of nursing education relevant to the South African context. These ranged from a 1-year certificate in nursing (ENA course); 2-year certificate in nursing (EN course); a diploma in nursing; a degree in nursing; master’s and doctoral degrees. Renumbered as question 5.

Q7: Regarding training for NVQ3, n=1 did not complete the question, n=1: yes, n=13: no, n=1 wrote not applicable, and n=1 indicated he/she did not understand the question, n=1 wrote a comment as “no nursing training”.

Alterations: These training options were not relevant to the South African context, as explained at the findings of question 6. The adjustment was made to incorporate nurse training that will lead to registration at the SANC, which is relevant to the South African context. Renumbered as question 6.

Q8: Table 3.2 indicates the responses to the question on job titles as follows: n=4 indicated job title as RN, n=5 ENs, n=5 ENAs, and n=3 did not complete this question. When cross-referencing job titles to question 4 of job role, participants provided their job titles at question 4 as follows: from the n=3 that did not complete this section, n=1 was a registered nurse, n=2 were enrolled nurses. Therefore, from the N=17, only n=5 (29.41%) were registered nurses, n=7 (41.18%) enrolled nurses, and n=5 (29.41%) enrolled nurse assistants. When comparing this with the information supplied by the managers of the two facilities, the total nursing staff of 25 employed at the two facilities was n=7 (28%) registered nurses, n=9 (36%) enrolled nurses and n=9 (36%) enrolled nurse assistants. When focusing on answering the research question of “What are the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province?” the relatively low percentage of registered nurses as an organisational resource will be investigated to meet the research objective RO2, under Section 1.6.

Alterations: The researcher removed “job title” as it was incorporated in the options “nurse category” in question 4 in the adapted questionnaire.

Table 3.2: Job titles of participants

Job titles	Participants (n)	Percentage (%)
RN	5	29.4
EN	7	41.2
ENA	5	29.4
Total = N	**17**	**100%**

Q9: When asking participants’ work experience in residential care in months, n=8 did not answer this question, n=1 wrote less than one year, n=2 between 1 and 2 years, n=2 between 2 and 3 years, n=1 between 3 and 4 years, n=2 between 4 and 9 years, and n=1 for more than 9 years.

Alterations: The researcher combined question 9 and 10 as both are relevant to nurses' work experience and changed the terminology to make it relevant to the South African context, namely "residential facilities for older persons". This was renumbered as question 7 on the adapted questionnaire.

Q10: Participants' work experience in a nursing home in months: n=3 did not answer, n=6 responded less than 12 months. n=1 indicated less than 2 years, n=2 between 2 and 3 years, n=1 between 3 and 4 years, n=1 between 4 and 9 years, and n=3 indicated they worked for more than 9 years in a nursing home. Although the questionnaire requested the participants to answer questions 9 and 10 in months, all participants answered in years. n=4 drew brackets around the two questions and provided one answer in either the space for question 9 or 10, indicating that the terminology "residential care" and "nursing home" can be confusing to participants.

Alterations: The researcher combined question 9 and 10 as both are relevant to nurses' work experience and changed the terminology to make it relevant to South Africa, namely "residential facilities for older persons", as explained in question 9. Options provided are stated as 1-12 months; >1 year – ≤ 2 years; >2 years – ≤ 3 years; >3 years – ≤ 4 years; >4 years – ≤ 9 years and >9 years. This was renumbered as question 7 on the adapted questionnaire.

Q11: n=16 participants indicated they work full-time, n=1 part-time, working 11 hours per day.

Alterations: In the subsection "if part-time, how many hours/days do you work?", the wording was changed to "if part-time, total shifts per week", to adapt it to the South African context where part-time staff are contracted per shift, as per the feedback from the staff participants. This question was renumbered as question 8, with question 9 for part-time employed participants to indicate their shifts per week.

Q12: All N=17 (100%) participants indicated their employer as the Home.

Alterations: The researcher changed the concept the "The home" to the "The facility", as to prevent confusion between participants' residential homes and the residential facility for older persons. Renumbered as question 10.

Section B: Medication supply, administration, and storage

Q13: n=9 indicated a trolley was taken directly to residents to dispense medications from, n=3 stated residents had a locked cupboard within their rooms, n=2: the trolley stayed in the treatment room and the nurse/carer took medication to the resident. n=1 replied that she used both systems

above. n=2 selected a combination between taking a trolley directly to residents and at times the trolley stayed in the treatment room and the nurse/carer took medication to the residents.

Alterations: Following the feedback from participants, the researcher added an option named "Medication is prepared in advance in the nurse's office and pill dispensers are taken out and carried to the resident by nurse/carer". This is a practice occurring in some facilities, according to feedback from participants. n=3 selected a combination of options, and this question was renumbered as question 11, followed by question 12 where participants could select a combination of options.

Q15: The responses to how often participants read the medication policy are displayed in Table 3.3 below as n=1 omitted data, n=2 said only when starting at the home, n=4 every 6 months, and n=10 selected "no specified periods". None of the participants selected the option of "yearly". The high percentage of participants (58.9%) that indicate that they read medication policies at "no specified times", could indicate that there is no specific timeframe noted in the facilities to guide the staff.

Alterations: The option "other (please state)" was removed, as no participants selected this option, indicating that the provided options were sufficient. Renumbered as question 14.

Table 3.3: Frequency of reading medication policies

Job titles	RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Only when starting at the Home	n=1 (20.0%)	n=0 (0.0%)	n=1 (20.0%)	n=2 (11.8%)
6-monthly	n=1 (20.0%)	n=3 (42.9%)	n=0 (0.0%)	n=4 (23.5%)
No specified times	n=3 (60.0%)	n=4 (57.1%)	n=3 (60.0%)	n=10 (58.9%)
Missing data	n=0 (0.0%)	n=0 (0.0%)	n=1 (20.0%)	n=1 (5.8%)
Total =N	**5**	**7**	**5**	**17 (100%)**

Q16: Regarding the storage of the medication policy, n=1 omitted data, n=1 did not know, n=1 in the medication room, n=1 in RN office and n=1 in RN office and nurses station, n=1 noted in the information files and n=11 stated it was kept in the nurses' station/duty room.

Alterations: As this question made provision for a written response to the storage of medication policies, the researcher restructured the question to include the options that the participants provided in writing. Therefore, participants will now be able to select from the list of options,

including “in the medication room”, “in the unit (frail care)”, “RN office”, and “unsure”. This question was renumbered as question 15.

Q17: Participants’ opinion on the most common reasons for drug errors elicited the following responses: n=0 selected the current system of drug administration is confusing and open to error, n=2 staff were overworked, n=3 poor/insufficient knowledge of the action of medications and their side effects, n=3 lack of training, n=6 indicated staff were under stress, n=6 selected shortage of appropriately qualified staff as an option. n=8 selected being under pressure to complete a drug round to a certain amount, while n=12 (70.6%) indicated interruptions to the round from other staff and residents as the most common reason for drug errors, as displayed in Table 3.4.

Alterations: No participants provided any other common reasons under the options “other”, rendering this option redundant. This led to the removal of the option “other”. The question was renumbered as question 16 on the altered questionnaire.

Table 3.4: Most frequent common reasons for drug errors: interruptions

Participants’ responses to question	Participants (n)	Percentage (%)
Yes	12	70.6
No	5	29.4
Total = N	**17**	**100%**

Q18: On which of the type of medication errors participants saw in their facilities, n=1 omitted data, n=1 saw no errors at his/her home, n=3 had seen a wrong dosage being given, n=5 saw wrong medication given to residents, n=6 saw medication given to the wrong resident, n=6 saw medication given at the wrong time, n=8 medication missed altogether, n=6 medications being administered after it was discontinued. ***Alterations:*** No participants offered any other types of errors under the option “other”, rendering this option redundant. This led to the removal of the option “other”. The question was renumbered as question 17.

Q19: The researcher asked the participants to rate their opinion on the most common errors of medication accountability, with 1 being the “most common” and 7 the “least common” errors of medication accountability. To the option of not signing for medication given, n=3 participants did not rate this option, n=10 rated this “most common” error, with n=4 “least common” error to them. To the option of not recording reasons for non-administration, n=3 did not rate this option, n=9 indicated that this was either a number 1 or 2, with n=5 allocating a number 6 or 7, indicating this was a “least common” error to them. n=9 rated that not recording actual amount given for variable dose prescriptions were “most common”, n=4 rated this “least common”, n=1 “somewhat

common", with n=3 participants not rating this option. Not recording time given for "pro re nata" (PRN) medications elicited a response of n=10 rating this most common, n=3 rating this least common, n=1 rating this somewhat common, and n=3 not rating this option. n=5 rated not booking in supplies the least common errors of medication accountability, n=9 rated this most common, and n=3 did not rate this option. Not having a witness sign for changes made to the MAR, was for n=14 a most common error, with only n=1 indicating this as the least common error, and n=2 not providing a rating. Participants were asked to list and specify any other type of errors and n=13 omitted this, n=2 indicated not applicable and 2 made comments, "if meds are not booked then blister packs are incomplete", and "not having a witness signed is very common". n=10 did not respond to the question "I have not seen any of these errors", while n=7 indicated the errors vary from somewhat to most common".

Alterations: Provision of all options rendered "other types of errors" redundant, which led to the removal of the option "other types of errors". As this question made provision for rating common medication errors from "most common" to "least common". n=3 omitted this rating, indicating it could be confusing to them. This led to the rearranging of the question to allow participants to select any of the options. The question was renumbered as question 18.

Q20: n=5 indicated that they attended drug administration training in the last 6 months, while n=1 attended training between 7 and 11 months ago. n=1 attended drug administration training between 1 and 2 years ago, n=2 between 3 and 5 years ago, n=2 between 6 and 10 years ago, n=2 more than 10 years ago with n=4 not answering the question. All health professionals in the facilities must receive two medication management training sessions per year per the National Department of Health's policy for residential facilities for older persons (Department of Health, 2011a). From the 13 participants that responded to the question, only n=5 (38.5%) attended training in the last 6 months, as indicated in Table 3.5.

Alterations: As this question elicited a written response from participants regarding the last drug administration training, in months/years, the researcher changed the answer choices based on participants' responses, to enable participants to select an option. The options are "in the last 6 months", "in the last year", "between 1 and 5 years ago", and "longer than 5 years ago". Question renumbered to question number 19.

Table 3.5: Last attended medication training

	Participants (n)	Percentage (%)
less than 6 months ago	5	29.4
7-11 month ago,	1	5.9
1-2 years ago,	1	5.9
3-5 years ago,	2	11.8
between 6-10 years ago	2	11.8
more than 10 years ago	2	11.8
Missing data	4	23.5
Total = N	**17**	**100%**

Q23: n=5 always knew the purpose of all the drugs they gave out, n=9 almost always knew, n=2 sometimes knew, and n=1 never knew.

Alterations: Changed the five-point Likert scale to three, by removing "almost always" and "almost never". Renumbered the question to 22.

Q24: Responses to the question on how often they administer drugs per week varied from per week, per day, and per shift. n=2 seldom administered drugs, n=3 administered drugs on every shift, n=1 once per day, n=3 noted 4 times per week, n=1 noted 7 times per week, n=2 noted 8 times per week, n=1 recorded 2 to 5 times a week, and n=4 questionnaires had missing data.

Alterations: This question required participants to write down how often they administer drugs per week, and this produced a wide range of answers. Verbal feedback from participants indicated that they were unsure whether the question referred to a shift or all the medication rounds. This question was changed to provide a list of options with timeframes based on the responses of participants as well as an explanation of the terms to enhance clarity. Included in the options are: "9-12 rounds per week (during most day shifts per week)", "4-8 rounds per week (during some of the day shifts per week)", "3-4 rounds per week (during most night shifts per week)", and "1-3 rounds per week (only when needed e.g., in emergencies, staff shortages, and some night shifts per week)". Renumbered the question to number 23.

Q26: Participants responded on how long drug rounds took as follows. Early morning: n=3 less than 30 minutes, n=10 between 30 minutes and 1 hour, n=1 between 1 and 1 ½ hour, with n=3 not completing the question. Lunchtime: n=10 less than 30 minutes, n=3 between 30 minutes and 1 hour, with n=4 not completing the question. Bedtime: n=4 less than 30 minutes, n=10 between

30 minutes and 1 hour, n=1 between 1 and 1 ½ hour, with n=3 not completing the question. All participants indicated zero at the teatime option.

Alterations: As all participants indicated zero at the teatime option, it indicated that this option was redundant, and it was therefore removed. The researcher also divided the question into three questions, to provide timeframe options for mornings, lunchtime and the evening. Renumbering of the question followed, therefore, numbered as 27, 28 and 29.

Q28: n=12 carried out a drug round alone, while n=5 did this with another person.

Alterations: Following the question of "Do you generally carry out the drug round? – (1) Alone, (2) Or with another person; the researcher altered the question to "Do you generally carry out the drug round alone? (1) Yes, (2) No. Renumbered to question 31.

Q29: n=11 indicated that they are very to extremely at ease with carrying out a drug round on their own, n=1 was neutral, and n=2 was somewhat uneasy to not at all at ease. n=3 did not answer the question. Only 21.4% of registered nurses were extremely at ease with carrying out a drug round on their own, and this pilot test indicates that the enrolled nurse assistants felt just as confident in executing this task as the registered nurses.

Alterations: Content not altered, but changed the level of numbers from 1 to 7 to a four-point Likert scale as follows: (1) Not at ease at all, (2) Somewhat uneasy, (3) Fairly at ease, and (4) Extremely at ease. Re-numbered to question 32.

Q30: Participants could select any options that apply to indicate the pitfalls/problems associated with their current method of stock control. n=1 omitted data and the other n=16 participants responded to the options as follows: It is time-consuming: n=6 agreed; it is easy to make a mistake: n=5 agreed; stock run out before the next order: n=10 agreed; order too much stock: n=4 agreed; involves too many staff members: n=4 agreed; uses too much storage space: n=0 agreed; no problem: n=6 agreed; do not know how much we have in stock at any one time: n=6 agreed.

Alterations: Content not altered, but the option of "no problem" was redundant as participants had the choice not to select options that were not a problem to them, and it was therefore removed. Renumbered to question 33.

Q31: If participants agreed to any of the statements in question 30, they were asked to specify the *most frequent problem:* n=5 conceded that running out of stock before the next order was the

most frequent problem, n=4 responded it was time-consuming, n=3: easy to make a mistake, and n=5 did not indicate the most frequent problem for them. The *least frequent problem* was n=3 running out of stock before the next order, n=2 ordering too much stock, n=1 it was easy to make a mistake, n=1 it involved too many staff, n=1 indicated it was not a problem, n=1 time-consuming, n=1 said not knowing how much stock they had at any one time and n=7 did not answer the question.

Alterations: This question was removed, as analyses of the collected data in question 30 will meet the study objectives.

Section C: Alterations to MAR

Q32: Participants could select some choices from the provided list to answer the question of who may make changes to MAR sheets. However, they added in writing other options as well. n=2 selected that a senior RGN may make these changes, n=1 selected senior manager, n=6 selected GP, n=1 added a written option of RN, EN, and ENA, n=1 added a written option of RN and EN, n=3 added written option of RN and GP, and n=3 added the written option of senior RN and GP. ***Alterations:*** As some of the job titles did not apply to South Africa, the provided options were not suitable for the South African context. Therefore, the researcher changed the job titles to fit the South African context. The question was renumbered to 34.

Section D: Special circumstances

Q37: Training on checking actions varied from RGN training n=4, RGN training in my home n=1, district/community nurse n=1, EN and ENA training n=4, and other n=5. Explanations for "other" ranged from the blister company, Tygerberg Hospital, Groote Schuur Hospital, to an agency, and "at college and here at work".

Alterations: Changing the options to whether participants have received training in the last 12 months, "yes or no", in the previous question, aligned it with the study objectives, therefore this question was removed.

Q38: Concerning the recording of pre-checks, n=6 selected "on MAR and care plan/notes", n=2 selected "in residents' care/nursing notes only", n=8 selected "other" and added, "vital signs doc, vital signs report, vital signs chart, vital signs forms, diabetic chart, and n=1 wrote in ENA files". n=1 did not answer the question.

Alterations: This question does not apply to the South African context, as the recording of checks is all the above options, as listed also by the participants. Therefore, this question was removed.

Q39: This question consisted of 15 statements with sub-questions under each statement.

Statement 1: Staff administering medications assumed that the content of the blisters was correct and therefore did not need thorough checking. n=4 conceded that this was true, n=12 untrue, and n=1 did not provide an answer. n=13 answered “yes”, they did come across a situation where the blisters were wrong, where n=4 did not. n=7 agreed that they did not find a problem with this, whilst n=5 disagreed, n=3 did not answer the question, and n=2 indicated the question was confusing.

Alterations: The last option of “I have found no problems with this: (1) Agree (2) Disagree was removed, as the answers of the previous subsections are aligned with the study objectives. After the word “blisters”, the researcher added the word “containers” to read “blisters/containers” as participants’ feedback indicated that the wording was confusing to them. Renumbered to 39, 40 and 41.

Statement 2: n=8 agreed, n=7 disagreed, and n=2 did not respond to the statement that staff assumed that the blisters on the racks were up to date. n=12 did come across a situation where the blisters were wrong, while n=3 did not, and n=2 did not respond.

Alterations: The same alterations were made as in the first statement above. Renumbered to 42, 43 and 44.

Statement 3: n=10 agreed, n=6 disagreed, and n=1 did not respond to the statement that staff assumed placement of blisters on the racks were in the correct residents’ section. n=9 did come across a situation where the blisters were wrong, n=7 did not, with n=1 not answering the question. n=9 indicated they agreed that some people do not make thorough checks, n=6 disagreed and n=2 did not answer the question. n=4 agreed that they did not find a problem with this, n=8 disagreed, n=3 did not respond, with n=1 writing “confusing” next to the question and n=1 adding two question marks behind the question.

Alterations: The same alterations were made for the statement above. Renumbered to 45,46 and 47.

Statement 4: n=6 agreed, n=9 disagreed and n=2 did not answer the question regarding the statement that there was a risk of interim medicines getting missed out of the normal drug

administration system because the blisters not being placed on the racks in the correct position. n=6 have seen missed medicines under this circumstance, n=9 did not see this, with n=2 not answering the question. n=5 conceded that they have come across blisters placed on the racks in the incorrect position, n=8 did not, and n=4 omitted an answer.

Alterations: After the word “blisters”, the researcher added the word “containers” to read “blisters/containers” as participants’ feedback indicated that the wording was confusing to them. Renumbered to 48, 49 and 50.

Statement 6: n=11 answered that it was true for their home that dose changes during the month resulted in removing the medication or adding it to blisters, with a risk of improper administration of medicines. n=5 stated that this was untrue for their homes, with n=1 omitting the data. n=10 did come across situations of unmade changes, whilst n=6 did not, and 1 omitted the data. n=5 responded “yes” to the question if there were other risks, with n=9 answering “no”. n=3 did not provide an answer.

Alterations: The last subsection 6.3: “Are there other risks” was removed as this was a question that stated it needs to be explored during the interview, which was not part of the study objectives. Renumbered to 53 and 54.

Statement 7: n=2 indicated that the racking system presented some difficulties, while n=15 did not find this problematic. n=4 stated the system was bulky, n=12 answered “no”, with n=1 not providing an answer. n=3 found it a pain to swap the different racks around, while n=12 did not have a problem with this, and n=2 did not answer the question. n=10 stated that it was easy to pop out the tablets from the racks, while n=4 found it not easy, and n=3 did not answer. n=6 answered “yes”, they did find that the blisters were not on the right racks, while n=11 selected “no”. n=4 responded that they indeed found that the blisters were not in the right order, while n=11 had no problem with this and n=2 did not provide an answer. n=6 found someone’s blister in the wrong section of the rack, n=11 did not find this problematic. n=6 indicated that opening blisters injured their fingers, in contrast to n=10 for whom it was not a problem, and n=1 did not respond to the question. n=8 agreed with the statement that they did not find any problems with the racking system, n=8 disagreed, with n=1 not providing an answer.

Alterations: Inserted the word “storage” after the word “racking” to read “racking/storage” system to clarify the statement. Subsection 7.3, 7.5 and 7.9 were removed, as they were a duplication and were not aligned with the study objectives. Renumbered to 55, 56, 57, 58, 59 and 60.

Statement 8: To the possibility of missing medication when residents were not there when it was their turn, n=11 stated this was true for their homes and n=6 stated it was untrue for their homes. n=10 had known this to happen, with n=7 who did not. On asking participants to tick various options as a method to prevent this from happening, n=2 selected MAR and n=10 selected “check blisters at end of round”. Next to this choice, participants wrote comments such as “remove blister for later” and “place blister on top of trolley”. n=1 used a notepad, n=1 said no prompt was required, n=3 selected “other”, of which n=1 noted they used MAR in conjunction with checking blisters at the end of the round, n=1 noted they used a MAR in conjunction with a notepad, n=1 noted he/she ensured residents had their medication before going on outings with the family.

Alterations: Inserted the word “containers” after the word “blisters” and removed option 5 (other) under subsection 8.3, as the options provided by the participants were included in the list. Renumbered to 61, 62 and 63.

Statement 9: n=11 stated it was easier to use MAR charts with additional identifiers to show which medicines were due and at which time, n=6 stated it was untrue. n=7 selected “yes”, there was a greater risk of medicines being missed when MAR charts did not have additional identifiers, e.g., colour coding, while n=10 selected “no”. n=1 came across an instance where colour coding was wrong, n=12 did not, and n=1 made a note to say colour coding not used and n=3 wrote not applicable.

Alterations: As colour coding is not relevant to the South African context, this statement is not appropriate for this study and was removed.

Statement 10: n=10 answered they were aware that CSCI inspectors look on MAR sheets for missing entries, n=6 was not aware, and n=1 did not answer. Providing an answer why missing entries are not recorded, n=9 noted it as time pressures, n=2 recorded there was not enough space on MAR charts, n=3 found no problem with this, n=1 selected “other” and specified laziness as a reason, and n=1 said it was a combination of time pressure and not enough space on MAR charts. n=1 did not provide an answer.

Alterations: The concept “CSCI inspectors” was replaced with “health auditors” to align it with the terminology used in South Africa. The sub-question “Were you aware of this?” was also removed, as this will not contribute to meeting the study objectives. Following feedback from participants, another option to choose from was added, namely “people forget”. Renumbered to 64.

Statement 11: n=11 answered they were aware that CSCI inspectors look for recorded reasons for not giving medications, n=5 was not aware, and n=1 did not answer. As reasons for not recording non-administration, n=8 indicated time pressures, n=3 indicated not enough space on MAR charts, n=3 found no problem with this, n=3 answered "other". Of this n=3, n=1 indicated people "forgot", and n=2 noted that it is a combination of time pressures and not enough space on MAR charts.

Alterations: The researcher made the same alterations as in statement 10 and renumbered the question to 65.

Statement 12: n=13 answered they were aware that CSCI inspectors look for the recording of the number/dose of "pro re nata" (PRN) medication on the MAR sheets, and n=4 was not aware of this. As reasons for not recording the number/dosage "pro re nata" (PRN) medications, n=5 indicated time pressures, n=3 indicated not enough space on MAR charts, n=4 found no problem with this, n=4 answered "other". Reasons were "forgot", "forgot to write in", "don't think it is necessary", and the resident takes different dosages". n=1 did not provide an answer.

Alterations: The researcher made the same alterations as in statement 10 and 11 and renumbered the question to 66.

Statement 13: n=10 agreed with the statement that the sharing of medicines, e.g., Lactulose and Movicol was unavoidable in their home, while n=7 said this was untrue for their home. Participants provided the reasons as n=8 residents' stock has run out, n=3 the prescription of new medication led to no stock available for that resident, n=5 indicated "other". Other reasons provided by participants were n=3 stated it was a combination of residents' stock has run out and the prescription of new medication led to no stock available for that resident. n=1 said it did not happen, and n=1 said each family must buy their own medicine. n=1 did not provide an answer. n=3 frequently saw this practice of sharing, n=3 saw it fairly frequently, n=4 saw this rarely, and n=7 indicated they never saw this practice. n=14 answered "yes" to the question of whether they thought that being able to store this type of medication within the trolley would reduce the incidence of sharing medicines, whilst n=2 did not agree. n=1 did not provide an answer.

Alterations: The researcher removed subsection 13.4 and 13.5 referring to the storage of medication on trolleys to reduce sharing and added this as another option to choose from at 13.2. Renumbered the question to 67 and 68.

Statement 14: n=14 stated it was true for their home that staff made new entries and countersigned medication changes, while n=3 stated it was untrue for their home. n=11 came across occasions of changing the MAR chart rather than making a new entry, while n=6 did not come across this. n=12 came across occasions where two people did not sign the changes, while n=5 did not come across this phenomenon. n=15 conceded to it being difficult to decipher other people's handwriting, while n=2 did not find this to be a problem.

Alterations: Removed question 14.1, as this was covered in 14.2. Renumbered to question 69, 70 and 71.

Statement 15: n=11 found it true and n=6 untrue for their home that when residents have several MAR sheets plus an interim MAR sheet placed at the back of existing sheets, it increased the risk of missing medications. n=2 had frequently seen this, n=3 had fairly frequently seen this, n=8 had rarely seen this, and n=4 indicated never.

Alterations: Removed question 15.1, as this was covered in 15.2. Renumbered to question 72.

Q40: On informing themselves of medication changes after days off, n=7 studied MAR charts, n=3 discussed this with colleagues, and n=7 did both.

Alterations: Removed the option of "other", as all options were covered and aligned with the study objectives. Renumbered question to 73.

Q41: Participants indicated that they sign MAR sheets after potting (n=12), and n=5 wrote in the words "after administering", "*wanneer medikasie gedrink* is", "sign after administering", "after administering of meds", and "sign after administering of meds". The second part of the question enquired of participants whether they have seen MAR charts signed on mass. n=8 answered "yes", and n=9 said "no".

Alterations: The word "potting" can be confusing as it is not the terminology used in the South African context. The researcher therefore included an explanation of "potting" and added options of signing when given to the resident. These options are based on practices in the residential facilities for older persons in the WCP, as provided at the feedback sessions with participants. Renumbered to 74. For the second part of the question, the researcher added an explanation of "signed on mass" in brackets, and renumbered this as a separate question, number 75.

Q42: Participants' opinion on the MAR chart folder: n=5 had no problem with this, and n=12 did indeed have a problem. n=1 found it too bulky, n=15 did not, and n=1 omitted a response. n=14

answered that it was easy to find patients' MAR charts in the folder, whilst n=2 did not agree and n=1 omitted a response. n=10 felt that the MAR chart holes get damaged and charts slide out, while n=7 did not have a problem with this.

Alterations: Removed 42.1 "I have no problems with the MAR chart folder" as this information is covered when participants chose the option of "no" in the subsequent questions. As none of the participants answered the last option of "other", this implied that they did not have other opinions not covered by the options. This consequently led to the removal of the option "other". Renumbered to 76, 77 and 78.

Q43: Participants' attitude towards the introduction of a new medication system to replace the one they were using elicited the following responses: n=5 very keen, n=7 fairly keen, n=4 neither keen nor reluctant, and n=1 very reluctant.

Alterations: This question was not relevant to this specific study as changing to new medication systems was not part of the study objectives and therefore the question was removed.

Q44: Upon enquiring who holds a positive attitude towards changing to a new medication system, responses were n=1 care home manager, n=4 senior RGNs, n=1 senior managers, n=1 other RGNs, n=1 senior care staff, n=2 GP, n=5 indicated a combination of all the options, with n=2 omitting the data. Answering who was the most positive, n=1 indicated care home manager, n=2 senior RGN, n=5 other RGNs, n=1 indicated a combination although asking the most positive. n=8 did not respond. When asked who was the least positive, n=1 indicated other RGNs, n=4 care staff, n=1 senior care staff, n=2 GP, with n=9 not providing any data.

Alterations: The researcher removed this question as changing to new medication systems was not part of the study objectives.

Q45: Upon enquiring who holds a negative attitude towards changing to a new medication system, responses were n=1 senior RGNs, n=1 care staff, n=1 other RGNs, n=5 residents/relatives, n=1 GP, n=4 indicated a combination of all the options, with n=4 omitting the data. Participants then had to indicate who is the most negative, with n=1 indicating senior RGN, n=2 other RGNs, n=2 residents/relatives, n=1 GP, and n=11 did not respond. When asked who was the least negative, n=1 indicated care home manager, n=2 senior RGNs, n=1 other RGNs, n=1 care staff, n=1 senior care staff, n=1 GP, with n=10 not providing any data.

Alterations: The researcher removed this question as changing to new medication systems was not part of the study objectives.

Section E: Computer use

Q46: Regarding the frequency of computer use at home, n=12 indicated they never use a computer at home, n=1 used it daily, n=2 used it weekly, n=1 used it monthly and n=1 did not respond. During the feedback sessions, several participants mentioned that the word “home” initially confused them, as they thought it possibly referred to the residential facility.

Alterations: The word “home” was changed to “house”, to eliminate confusion between a residential facility and the participants’ residential homes. Renumbered to 79.

Q47: Participants could select any of the options to indicate what they use a home computer for. However, although n=12 indicated that they never use a computer at home, there was no option to leave this question out. Therefore, n=10 did not answer but wrote “n/a” next to the question, and n=1 left the question blank. Responses were as follow: playing games: n=0; spreadsheets: n=0; word processing: n=2; emails: n=5; internet for information gathering n=0; internet for finance: n=0; internet for chat/discussion rooms: n=1; internet for shopping: n=0; and other: n=1, with the comment “only when I watch a movie”.

Alterations: As question 46 had the option of “never”, the researcher provided the participants with the option of not answering this question if they answered in question 46 that they never used a computer at home. The option of “other” was removed, as the options relevant to the study objectives were covered. Renumbered the question to 80.

Q48: Regarding the frequency of computer use at work as seen in Table 3.6, n=15 indicated they never use a computer at work, n=1 used it daily, and n=1 did not respond. As discussed in Chapter Two (2), Section 2.4.3, technology and tools such as mobile devices and computers can be valuable in medication management to assure the quality and safety of residents (Szczepura *et al.*, 2011:1–10; Ventola, 2014:356–364). In this pilot test, only one out of 16 participants used a computer at work.

Table 3.6: Frequency of computer use at work

Computer use of participants at work	Participants (n)	Percentage (%)
Never	15	88.2
Daily	1	5.9
Missing data	1	5.9
Total = N	**17**	**100%**

Alterations: The researcher changed the wording of the question "How often do you use a computer at work?" to "If you have a computer or access to a computer at work, how often do you use it at work?". This followed due to the feedback from participants that although they can use a computer at work for tasks, they do not have access to a computer at work. This question was renumbered to 81.

Q49: Participants could select any of the options to indicate what they use a work computer for. n=11 did not answer but wrote "n/a" next to the question, and n=2 left the question blank. Responses were as follow: patient data/records: n=3; email: n=4, ordering/stock control: n=4, word processing: n=2; management (e.g., off duty, bed status): n=3; playing games: n=0; internet for information gathering n=1; spreadsheets: n=2; internet for chat/discussion rooms: n=4; internet for shopping: n=0; and other: n=0. As n=15 indicated they never use a computer at work and only n=1 used it daily, the answers to the question do not project real values.

Alterations: As question 48 had the option of "never", the researcher provided the participants with the option of not answering this question if they answered in question 48 that they never used a computer at work. Changing words such as "emails" to "work emails" followed to elicit more work-related responses. Renumbered to 82.

Q50: At formal training in computer use (e.g., CLAIT, RSA, ECDL), n=5 answered "yes", and n=12 "no". During the feedback sessions, some participants mentioned that they said "no", since they did not have any knowledge regarding provided examples.

Alterations: The examples of formal computer training were unfamiliar to participants and removed. Renumbered to 83.

Q52: Regarding confidence in terms of computer use, n=4 (25%) were very confident, n=2 (12.5%) fairly confident, n=4 (25%) average, n=1 (6.3%) fairly low confidence, and n=5 (31.3%) indicated that they had very low confidence in computer use.

Alterations: To focus on relevancy to the study objectives, the researcher removed this question regarding confidence in computer use.

Section F: Mobile phones

Q53: N=17 (100%) indicated that they do own a mobile phone.

Alterations: As all participants indicated they do own a mobile phone; the researcher changed the question to elicit the answer of whether they may use their phone for work purposes. and for what specific tasks in the workplace, to meet the study objectives. Renumbered to question 85.

Q54: n=11 responded that they own a PDA or smartphone, while n=6 said “no”.

Alterations: Removal of this question followed since participants indicated in the feedback sessions that they were unsure of the difference between a smartphone and regular cellular phone.

Q55: Regular tasks using mobile phones were make calls: n=16; text people: n=15, listen to music: n=10; take photographs: n=12; check emails: n=12; surf the internet: n=8; create documents: n=5; instant messaging: n=8; play games: n=6; other: n=2, “calculator”; “calculator and for reminders”.

Alterations: An option was added that if participants were indeed allowed to use their phone for work purposes, to answer this question. Also, the words “work-related” were added, to elicit specific work-related answers. Adding options of “calculator” and “reminders” to the data collection instrument can elicit valuable information concerning medication calculations and reminders for time-sensitive medication administration, therefore, these options were added. Renumbered to question 86.

Section G: Strengths, weaknesses, opportunities, and threats of participants’ current system of medication ordering, supply, storage, and administration

n=3 left this whole section out, and some information was inappropriate such as under strengths a participant wrote “very important”. n=8 did not answer this section but commented as follows:

"redundant, questions already answered"; "section covered already"; "these questions have been covered already"; "dit is reeds gedek"; "n/a"; "it's already covered"; "all questions are answered"; and "duplication of previous questions". The following is a summary of the available written responses:

Strengths: "less time consuming/medication rounds are shorter with blisters"; "convenient as with blister packs staff do not have to halve Tablets"; "blister packs are hygienic as you do not have to touch the meds"; "supplying once a week prevent shortages"; "medication is correct as it is checked by a pharmacist"; "blister packs are easy".

Weaknesses: "stock not sent to pharmacy"; "late deliveries from pharmacy"; "interim medication not packed"; "one nurse for too many residents"; and "disturbances during medication rounds". *Opportunities:* "in-service training to prevent wrong dosages".

Threats: "lack of competencies"; "no time for packing of medication"; "medication not sent in on time for blister packaging"; and "medication storage areas too small".

Except for the remark about hygienic handling of medication, which is not relevant to this study, the questionnaire covered all other aspects in the previous sections. This confirms that Section G is repetitive.

Alterations: The researcher removed this section based on n=11 participants not completing this, with writing comments such as "covered already, this is duplication, this is redundant".

Section H: Sources of job pressure

Participants ranked 26 sources of job pressure from 1=no pressure to 5=high pressure. n=6 ranked increased demands from residents and increased workloads as high pressure. n=5 ranked inappropriate demands from residents, dealing with problem residents, insufficient time to do justice to the job, and long working hours as high pressure. n=4 ranked 24-hour responsibility for residents, unrealistic high expectations of the role by others and paperwork as high pressure. n=3 ranked dealing with very ill residents and relatives, working environment and home set-up, fear of assault at work dealing with conflict within the home, and professional isolation as high pressure. n=2 ranked dealing with earlier discharges from hospital as high pressure, disturbance of home/family life by work, dividing time between work and spouse/ family, unsociable hours, insufficient resources within the home, lack of support within home, the pace of change within homes, lack of appreciation from residents as high pressure. Only n=1 rated the emphasis on

resource issues in the home, organisational changes in the homes, adverse publicity by media and worrying about complaints/litigation as high pressure. n=8 indicated that adverse publicity by the media presents no job pressure, with n=6, ranked a lack of support within the home, conflict within the home, dividing time between work and spouse/family and disturbance of home/family life by work as no pressure.

Alterations: Changing the layout and not the content of this section facilitated coding. Re-labelled as Section G, number 84. The five-point Likert scale changed to a four-point Likert scale using “no pressure”, “low pressure”, “moderate pressure”, and “high pressure”.

Based on the response of the participants, the information gathered during the information sessions, and the observations by the researcher, the researcher made the following general changes to the data collection instrument:

General adaptations

The original prospective study questionnaire used in the United Kingdom included follow-up interview questions. Therefore, removal of all the questions giving participants the option to provide additional answers under the category “other”, seemed applicable. Where possible, the researcher provided them with all options as displayed by participants. Replacing the word “drug” with “medicine”, answered participant’s questions if “drug” refers to only schedule 5, 6, and 7 medications. The word “home” in the questionnaire was changed to “facility” to fit the South African context. With the subsequent changes, renumbering the questionnaire followed.

A limitation of the pilot test was the total participants due to the COVID-19 lockdown of the residential facilities for older persons in the Western Cape on 18 March 2020, which was sooner than the national lockdown starting from 26 March 2020 (Department of Health, 2020b). These participants were not part of the main study and the findings not used in the main study as the researcher used their data to optimise the data collection instrument.

3.8 VALIDITY AND RELIABILITY

To conclude the evidence of a study the collected data must reflect the reality. Research must be rigorous; therefore, the data must be valid and reliable. The degree of excellence associated with the findings of the study will thus depend on the reliability and validity of the measurement methods (Polit & Beck, 2010:370,373,377). The following subsections describe how the researcher ensured the validity and reliability of the study.

3.8.1 Validity

Validity refers to how well the data collection instrument measures the non-concrete concepts identified by the researcher and includes four components (Grove & Gray, 2019:267–269). **Construct validity** requires alignment between what the instrument measures and the operational definitions identified by the researcher (Grove & Gray, 2019:268). As Donabedian's Structure-Process-Outcome Quality of Care Model (2005:691–729) was the theoretical construct underlying this study, the researcher described the factors associated with safe medication administration in residential facilities for older persons under the structure, process, and outcome measures. According to Donabedian's model, the structural measures will have an impact on process measures, which in turn will impact the outcome, which is safe medication administration (Donabedian, 2005:691–729). The researcher used a validated instrument to test the impact of nurse resources, organisational resources, and infrastructure on the medication administration process. Also, the instrument tested the impact of the medication administration process, including policies and legislation, on the outcome of safe medication administration.

Content validity requires the instrument to have enough items to allow for the measurement and coverage of the constructs (Polit & Beck, 2010:377, 378). **Face validity** refers to whether the instrument appears to participants as if it is measuring the constructs (Polit & Beck, 2010:377). **Criterion-related validity** requires that the scores obtained by the instrument used by the researcher correspond with scores obtained from another similar instrument (Polit & Beck, 2010:378). As the researcher used a validated tool, as discussed under Section 3.6, a pilot test ensured the testing of the instrument, refinement thereof, and adaptation to fit the South African context. This aligned the instrument with the study's underlying theory, literature review, and research objectives. The all-inclusive questionnaire assisted the researcher to draw conclusions and develop generalisations to suggest application in other similar settings. Thus, with the support of the supervisor and input from a Stellenbosch Biostatics Unit statistician, the researcher assured validity.

3.8.2 Reliability

To be reliable, the data collection instrument must measure the phenomenon under investigation without change, hence when repeated with the same person within a short time-frame, they should get similar scores (Grove & Gray, 2019:264; Polit & Beck, 2010:373). To ensure this, the researcher did pre-testing of the instrument during the pilot test. By using the researcher's clinical

experience and knowledge together with advice from experts it refined the instrument concerning the following:

- insertion of the title of the study;
- insertion of the aim of the study;
- insertion of terms and definitions;
- insertion of instructions to participants; and
- removal of qualitative data collection information that refers to interview questions at the following question numbers: 15,19, 26, 27, 36, 39, and 41, and reference to an exploratory study in heading Section G.

This aligned the instrument with the proposed study's underlying theory, literature review, and research objectives. The testing and retesting of the data collection instrument, determined how reliable or stable the measurement methods were. Furthermore, doing an equivalence test determined interrater reliability, which means comparing two versions of the same instrument. The obtained value should be 0.90 or higher (Grove & Gray, 2019:265–267). To test for internal consistency, the researcher, with the input of a statistician, performed statistical analysis with the Cronbach's alpha coefficient test, by using the Statistical Programme for the Social Sciences version 26 (SPSS26). Grove and Gray (2019:267) describe the Cronbach's alpha coefficient test as a reliability test to measure the internal consistency of options within a Likert scale question. A Cronbach's alpha coefficient of 0.0 indicates no reliability, with 0.8 as strong reliability, and 1.00 indicates that the options within the Likert scale question are similar and thus have real value. A discussion of the statistical tests' results will follow in Chapter Four (4).

3.9 MAIN STUDY: DATA COLLECTION

Grove and Gray (2019:45) describe data collection as a systematic and exact way to gather information about the research question and objectives. The data collection took place in selected residential facilities for older persons in the Metro-North, WCP. As discussed in Chapter One (1), Section 1.8.7, the unforeseen circumstances of the declaration of a national disaster in terms of the Disaster Management Act 57 of 2002 due to the COVID-19 pandemic led to the instatement of a national lockdown in South Africa on 26 March 2020 (RSA, 2002). Further extension of the lockdown with travel restrictions and strict lockdown of the residential facilities for older persons in the WCP necessitated minor changes to the data collection method and timeframe (Department of Co-operative Governance, 2020; Department of Co-operative Governance and Traditional Affairs, 2020a,b,c,d). The researcher applied to the Health Research Ethics Committee at the

University of Stellenbosch for a minor amendment to the study protocol and the adjustment of the timeframe for data collection and it was approved on 10 June 2020. The minor changes were for using paper-based questionnaires that would be hand-delivered, concerning virtual online questionnaires, which led to an adaptation in the data collection timeframe. The motivation for these adaptations was:

- No residential facility for older persons in the WCP allowed entrance to any visitors, including students for data collection purposes, in line with the national lockdown regulations (Department of Health, 2020b).
- Older persons are classified as a vulnerable group as stated in the Older Persons Act 13 of 2006 (RSA, 2006).
- As indicated in the approved protocol, data collection would take place in 28 residential facilities for older persons in the Metro-North, WCP. This would require the researcher to visit different facilities for all four shifts, increasing the risk of spreading potential infections to vulnerable older persons.
- The researcher pre-tested the validated data collection instrument before initiation of the national lockdown and therefore had data available regarding the use of cell phones and computers. The pilot study indicated that 100% of the participants in the pilot study (N=17) owned cell phones. From the N=17 participants in the pilot study, n=4 used computers at home, and n=1 used a computer at work.
- This amendment allowed the researcher access to the target population, which would not have been accessible otherwise due to the national lockdown (Department of Health, 2020b).
- Virtual research would not only protect vulnerable older persons but also avoided the possibility of contaminated paper questionnaires.

Consequently, data collection took place over 11 weeks, between 12 June 2020 and 30 August 2020, as displayed in Table 1.3 in Chapter One (1).

An email was sent to the selected residential facilities for older persons to explain the purpose of the research study and to ask written permission. Afterwards, the researcher sent a shortened online link to the questionnaire to the facility managers who provided permission, which they could supply to the staff who were willing to participate. Participants received a two-week period to complete the online questionnaire. This measure ensured that the researcher did not have access to the names or contact details of potential participants. The online questionnaire included the

title of the research study and an introductory session. The introductory session started with an invitation to all registered nurses, enrolled nurses, and enrolled nurse assistants involved in medication processes in residential facilities for older persons to participate in a research project. It also included the aim of the research study, and that the researcher would use the data collected from this study to make recommendations for changes in work structures and procedures, to ensure safe medication administration in residential facilities for older persons in the Western Cape.

Also, participants were assured in the introductory section of the questionnaire that participation in the research was entirely voluntary, and participants were free to decline or withdraw at any time during the research with no negative consequences to themselves. It also stated the description of the type of questions including qualifications, experience, training and employment status, medication-related questions including policies available to participants, and the medication procedures followed by participants in their facilities. Participants could also express their opinion about the current medication systems in their facilities, as well as the level of job pressures they experienced.

Furthermore, participants were assured that there were no risks involved in this study, however, it could be a minor infringement on their private time as the questionnaire took about 20 minutes to complete. Although there were no immediate benefits for participating in this research study, participants would contribute to a body of knowledge regarding safe medication administration in residential facilities for older persons. Assurance was provided to ensure confidentiality, by stating that the questionnaire would not have participants' names on, identification was by code only and all referral to the data was only by code throughout the study and afterwards. Participants were informed that they would not receive payment to take part in the study, and there would also be no costs to them should they agree to participate. However, voluntary participants could select at the end of the questionnaire the option to receive a cell phone airtime voucher from a service provider of their choice as compensation for expenses incurred for data usage and inconvenience. Also, the researcher provided a contact number for participants who wished to ask clarifying questions to clear uncertainties. On the email to the facility managers, the written consent form in English, Afrikaans, and isiXhosa was attached. These measures indicated respect for the participants' choice of language.

Following the introductory section of the questionnaire was a mandatory section where the participants had to declare that they consent to participate in the study before they could complete

the questionnaire. The researcher sent the online personalised questionnaire for testing to a colleague and the supervisor. Received responses were automatically captured on a Google Forms spreadsheet. The electronic data are password protected.

3.10 DATA ANALYSIS

Gray and Grove (2019:45,299) describe quantitative data analysis as a rigorous process that entails the conversion of the collected data into a numerical format to enable statistical analysis. By using statistical techniques, the data are examined, condensed, and interpreted. The rationale is to facilitate insight and to give meaning to the data. Consequently, the production of study results can follow. This process includes two categories, namely descriptive and inferential statistics.

3.10.1 Descriptive statistics

Polit and Beck (2010:398) describe descriptive statistics as the process to summarise sample characteristics, to document features such as response rates, and to describe the research variables. It corresponds with what Grove and Gray (2019:299) states, namely that descriptive statistics describe the sample and research variables. Also, Polit and Beck (2010:398) stated that descriptive statistics can also be used to document response rates. Descriptive statistical analysis was done for this study, including frequency distributions, measures of central tendency, and measures of dispersion. The data were further organised and are presented in Chapter Four (4) in custom tables, frequency tables, pie diagrams, and bar graphs.

3.10.2 Inferential statistics

By using inferential statistics, the researcher can address the study objectives and estimate the parameters of the research questions in the study. In contrast with descriptive statistics that describe the data, inferential statistics allow the researcher to make inferences or predictions based on the data (Grove & Gray, 2019:229; Polit & Beck, 2010:392). Consequently, the researcher used inferential statistics in this study to enable making generalisations from the sample study data to the wider target population, in this case, the N=430 nurses working in residential facilities for older persons in the Metro-North area of the Western Cape Metropole.

3.10.3 Preparing data for analysis

Before the distribution of the research questionnaires, it was pre-coded for each facility. Each variable on the questionnaire was also pre-coded and given a short title. Upon receiving each completed questionnaire, a reference number was assigned to the respondent. By using a Microsoft Excel spreadsheet, the variables were entered horizontally in the columns, and the reference number of each respondent in a vertical column, with each row representing one respondent. The researcher then entered each response to each variable in the row. The data was verified twice by the researcher and randomly checked by an independent person to verify the accuracy of the data capturing process.

By counting the number of similar responses for each category, it was converted to a percentage of those who opted to select that answer. After capturing all the data on the Microsoft Excel spreadsheet, the researcher imported the spreadsheet into the Statistical Package for the Social Sciences Version 27 (SPSS27). A qualified statistician from the Stellenbosch Biostatics Unit assisted the researcher with the analysis. A complete description of the results of the statistical analysis will follow in Chapter Four (4).

3.10.4 Questionnaire response rate

After obtaining consent from the facility managers at the residential facilities for older persons in the Metro-North, WCP, a shortened link was sent to the manager for distribution to the registered nurses, enrolled nurses, and enrolled nurse assistants involved in medication administration. As some managers indicated that their staff either did not have internet access, the facilities are short-staffed due to the COVID-19 pandemic or did not feel comfortable completing online questionnaires, paper-based questionnaires were also delivered and collected at certain facilities. The total population of the study consisted of N=203 and the number of returned questionnaires N=123. When dividing the number of returned questionnaires by the study population (N=203) the response rate was 60.59%.

3.11 SUMMARY

Chapter Three (3) contains a detailed discussion of the study setting, study design, population, and sample. This discussion also includes the data collection instrument used in the pilot test with the alterations made to the data collection instrument for utilisation in the main study. The researcher described the rigour of the study, specifically the assurance of validity and reliability of the instrument. Also included was the data collection process and how data analysis was done.

3.12 CONCLUSION

This chapter provided an in-depth discussion of the research methodology used in this research study. A detailed discussion of the findings of the study as it relates to the research study's aim and objectives follows in Chapter Four (4).

CHAPTER 4
RESULTS

4.1 INTRODUCTION

Building on the in-depth discussion of the research methodology in Chapter Three (3), this chapter contains a detailed discussion of the findings of the study as it relates to the research study's aim and objectives. It includes a description of the collected data, the data analysis process, and interpretation of the data. The Statistical Package for the Social Sciences version 27 (SPSS27) was used to capture, store, and analyse the data, with the assistance of a biostatistician from the University of Stellenbosch. Statistical tests used include the Pearson Chi-square, the Pearson product-moment correlation coefficient, Spearman's Rho 2-tailed statistical test, means, standard deviation, and Cronbach's Alpha. As the researcher followed a descriptive design with a quantitative approach, the results are mainly presented in tables, figures, frequencies, and bar graphs. The description of the results is under structural, process, and outcome measures, according to the components in Donabedian's Quality of Structure-Process-Outcome Quality of Care Model (Donabedian, 2005:691–729).

4.2 CATEGORIES AND SUB-CATEGORIES

The data collection instrument consisted of seven subsections that correlated with factors associated with safe medication administration in residential facilities for older persons. The categories and sub-categories are set out according to the conceptual framework described in the preceding paragraph and are presented in Table 4.1.

Table 4.1 Categories and sub-categories emerging from the subsections of the questionnaire

Categories	Sub-categories
Component No 1: Structural measures	
Section A1: Nurses as resources in the medication administration process	Variable 1: Biographical data Variable 2: Medication training Variable 3: Computer training Variable 4: Sources of job pressures in the workplace
Section A2: Organisation infrastructures and resources	Variable 5: Medication storage systems Variable 6: MAR chart folders
Component No 2: Process measures	
Section B1: Medication policies	Variable 7: Availability of policies Variable 8: Frequency of reading policies Variable 9: Storage of policies
Section B2: Medication management process	Variable 10: Medication administration Variable 11: Recordkeeping
Section B3: Use of technology	Variable 12: Computers at home Variable 13: Computers at the workplace Variable 14: Mobile phones
Component No 3: Outcome measures	
Section C1: Changes to residents' health status	Variable 15: Errors encountered in facilities
Section C2: Implications of medication errors for facilities	Variable 16: Confidence in the safety of medication administration systems Variable 17: Medication accountability Variable 18: Resource related medication errors

4.3 COMPONENT NO 1: STRUCTURAL MEASURES

According to Donabedian (2005:691-729), structural measures or input measures include the care delivery setting, which in this study was the residential facilities for older persons in the Metro-North, WCP. Consequently, this included nurses as resources in the medication administration process as well as organisational infrastructures and resources. This assisted in obtaining research data to address research objectives *RO.1* and *RO.2* as indicated in Chapter One (1). As such, nurses' characteristics and the available resources in the residential facilities for older persons had an impact on processes, which had an impact on the outcomes, in this instance: safe medication administration to the elderly in residential facilities for older persons (ACT Academy, 2018; Donabedian, 2005:691–729).

4.3.1 Section A1: Nurses as resources in the medication administration process

Section A of the data collection instrument included questions to gather socio-demographical data to describe the study population. Concerning socio-demographical data, ***Section C*** of the data collection instrument required participants to indicate the training they received relating to medication administration, as well as computer training in ***Section E.*** Sources of job pressures from ***Section G*** were included to provide a comprehensive overview of nurses as resources in the medication administration process.

4.3.1.1 Variable 1: Biographical data

To meet research objective *RO.1* in Chapter One (1), this section included the study participants' biographical data, such as the participants' age, gender, nurse category, and level of nursing education. Participants were also asked whether they were busy with further nursing studies that would lead to registration at the SANC, their years' experience in residential facilities, whether full-time or part-time employed and who they were employed by. The analysed data are displayed in figures, graphs, and frequency tables.

- **Item: A1 (Section A Question 1): Age**

With N=123 (100%) participants that completed the questionnaires, n=114 (92.7%) participants indicated their age in real years, with n=9 (7.3%) not completing this section. Figure 4.1 illustrates the age distribution of participants. With the distribution of participants skewed to the right on the Bell curve for normal distribution, it indicated that nurses, including RNs, ENs, and ENAs working in these residential facilities for older persons, were a more mature group. The average age of n=114 (92.7%) was 51.31 years (s = 11.029), with n=22 (19.3%) of the n=114 (92.7%) participants 61 years or older with a minimum age of 22 and a maximum age of 77 years.

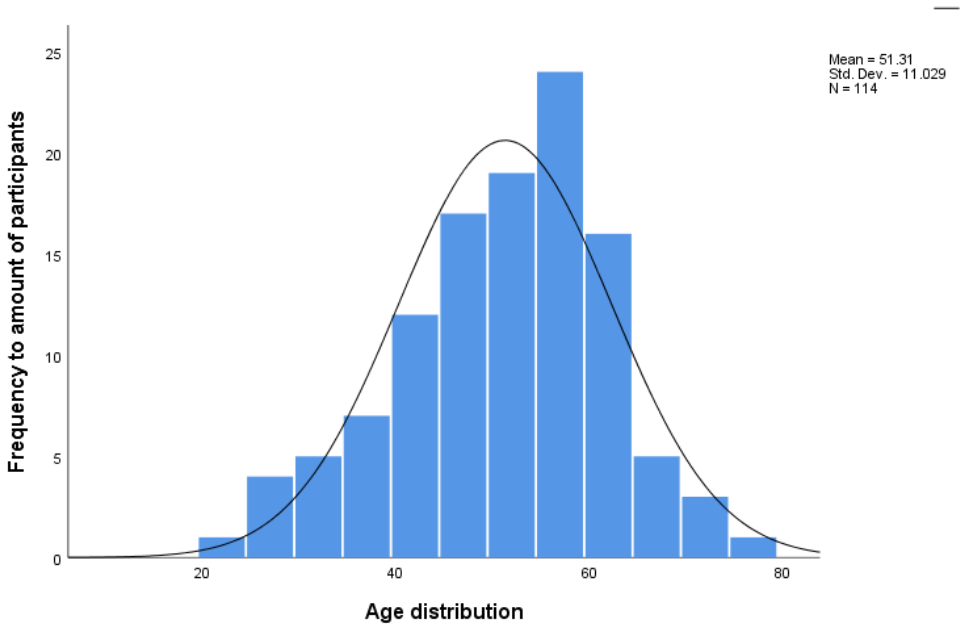

Figure 4.1 Age distribution and frequency of the number of participants

- **Item: A2: Gender**

The response rate to this question asking about participants' gender was N=123 (100%), and all N=123 (100%) indicated female.

- **Item A3: Nurse categories**

As indicated in Figure 4.2, the distribution of nurse categories partaking in the study showed that registered nurses, n=34 (27.6%) and senior registered nurses, n=26 (21.1%), form 48.7% of the study population N=60 (48.7%). This was slightly lower than the enrolled nurses, N=35 (28.5%) and enrolled nurse assistants N=28 (22.8%) combined, namely n=63 (51.2%). It must be brought under the readers' attention that the scope of practice of the enrolled nurse assistants in South Africa does not include medication administration, and the scope of practice of enrolled nurses limits their involvement with medication administration under the supervision of a registered nurse (SANC, 1984). In the ensuing data analysis, senior registered nurses, and registered nurses were treated as one category, namely registered nurses (RNs).

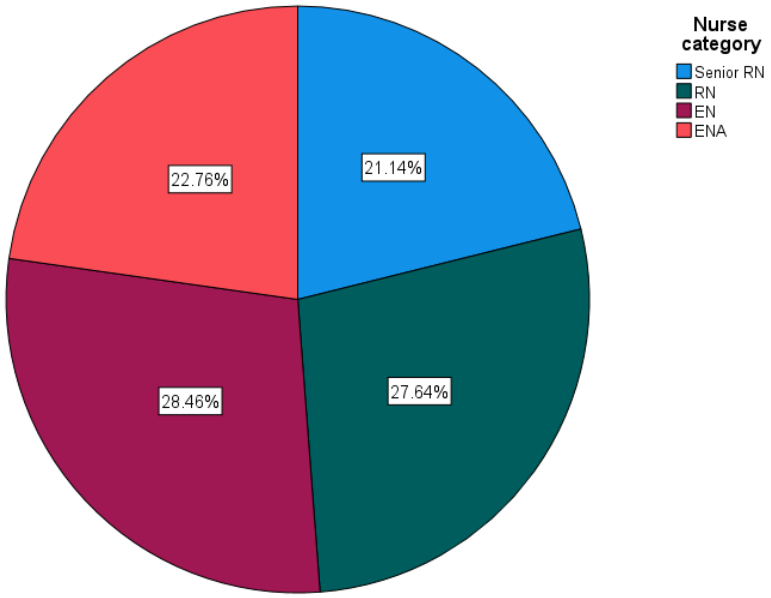

Figure 4.2 Nurse categories

- **Item A4: Level of nursing education**

Table 4.2 indicates the level of nursing education of participants. As only one of the participants indicated a master's degree, this category was included with the *"degree in nursing"* category. In the ensuing data analysis, these two categories will form one category. No participants had doctoral degrees, n=0 (0.0%). With the increase in acuity levels of residents and challenges with polypharmacy, the relatively low percentage of registered nurses with baccalaureate degrees n= 6 (4.8%), and with a master's degree of n=1 (0.8%) is regrettable.

Table 4.2 Level of nursing education

Level of nursing education	Participants (n)	Percentage (%)
1- year certificate in nursing (ENA course)	28	22.8
2-year certificate in nursing (EN course)	35	28.5
Diploma in nursing (RN course)	53	43.1
Degree in nursing incl. master's degree	7	5.7
Total = N	**123**	**100%**

- **Item A5: Further nursing studies**

Regarding the staff's participants' intention to pursue further nursing studies that would lead to registration at the SANC, n=8 (6.5%) indicated that they were indeed busy with further nursing studies. Table 4.3 indicates that there was a representation of participants undertaking further

nursing studies in each category of nurses, with the RNs n=4 (6.7%), ENs n=3 (8.6%), and lastly the ENAs n=1 (3.6%). The response rate to this question was N=123 (100%).

Table 4.3 Further nursing studies

Participants undertaking further nursing studies	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=4 (6.7%)	n=3 (8.6%)	n=1 (3.6%)	n=8 (6.5%)
No	n=56 (93.3%)	n=32 (91.4%)	n=27 (96.4%)	n=115 (93.5%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item A6: Work experience in residential facilities for older persons**

The response rate to this question was N=123 (100%). Table 4.4 indicates that most participants had experience in residential care for older persons. The largest group of n=42 (34.1%) had between four and nine years work experience and the second largest group of participants, n=34 (27.6%), indicated that they had more than nine years' experience. The ENAs, relative to the size of the group, at n=13 (46.4%) were the most experienced in terms of working in residential facilities for older persons, suggesting the possible reason for utilising them for medication administration, although out of their scope of practice in terms of the SANC (SANC, 1984).

Table 4.4 Participants' work experience in residential facilities for older persons

Work experience	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
1-12 months	n=3 (5.0%)	n=3 (8.6%)	n=1 (3.6%)	n=7 (5.7%)
>1 year – ⩽ 2 years	n=4 (6.7%)	n=6 (17.1%)	n=2 (7.1%)	n=12 (9.8%)
>2 years – ⩽ 3 years	n=4 (6.7%)	n=3 (8.6%)	n=1 (3.6%)	n=8 (6.5%)
>3 years – ⩽ 4 years	n=9 (15.0%)	n=7 (20.0%)	n=4 (14.3%)	n=20 (16.3%)
>4 years – ⩽ 9 years	n=26 (43.3%)	n=9 (25.7%)	n=7 (25.0%)	n=42 (34.1%)
>9 years	n=14 (23.3%)	n=7 (20.0%)	n=13 (46.4%)	n=34 (27.6%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Items A7-A9: Employment status, and a total of part-time shifts**

Of the total study population of N=123 (100%), all indicated their employer as the facility. Most of the N=123 (100%) participants worked full-time referring to n=112 (91.1%), while only n=11 (8.9%) worked part-time. The n=11 (8.9%) participants indicated that their part-time shifts varies or differs between two and 4 four shifts per week, with n=5 (4.06%) working two shifts, n=4 (3.2%) working three shifts, n=1 (0.8%) working four shifts per week, and n=1 (0.8%) omitted this data.

4.3.1.2 Variable 2: Medication training

Participants were asked to respond on how long ago they last attended medication administration training, and whether this training involved looking at the side effects of common medications and what these medications do. Concerning general medication administration training, participants were requested to indicate whether they received training in the last year to perform specific checks before administering medication under special circumstances.

- **Item B18: Last medication training received**

Participants that did not receive medication training in the last year equates to n=80 (65.0%). An equal number of participants received their last medication training within the last year n=43 (35.0%) and longer than five years ago n=43 (35.0%), as shown in Table 4.5. The statistical analysis indicated a mean score of 2.00, with a standard deviation of 0.840. The minimum score was 1 and the maximum 3, N=123 (100%).

Table 4.5 Last medication training received

Last training received	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
In the last 6 months	n=10 (16.6%)	n=7 (20.0%)	n=2 (7.1%)	n=19 (15.4%)
In the last year	n=14 (23.3%)	n=8 (22.8%)	n=2 (7.1%)	n=24 (19.5%)
Between 1 and 5 years ago	n=16 (26.7%)	n=8 (22.8%)	n=13 (46.4%)	n=37 (30.1%)
Longer than 5 years ago	n=20 (33.3%)	n=12 (34.3%)	n=11 (39.3%)	n=43 (35.0%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item B19: Training on the side effects of common medications**

With n=1 (0.8%) not responding to the question whether participants received training on the side effects of common medication, n=90 (73.8%) of all category staff participants indicated *"yes",* and

n=32 (26.2%) did not receive this training. Table 4.6 indicates that half of the ENAs in the study population n=14 (50.0%) did not receive training on side effects of common medications.

Table 4.6 Training on the side effects of common medications

Participants received training on the side effects of common medications	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=50 (84.7%)	n=26 (74.3%)	n=14 (50.0%)	n=90 (73.8%)
No	n=9 (15.3%)	n=9 (25.7%)	n=14 (50.0%)	n=32 (26.2%)
Missing data (did not complete)	n= 1 (0.8%)	n= 0 (0.0%)	n= 0 (0.0%)	n= 1 (0.8%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item B20: Training on what common medications do**

The response rate to this question was N=123 (100%). Results showed that participants indicated that n=95 (77.2%) received training on the indications of common medications, as displayed in Table 4.7, although n=28 (22.8%) did not. As in the previous question (Item B19), the ENAs n=11 (39.3%) appeared to receive the minimum training on indications of common medications.

Table 4.7 Training on what common medications do

Participants training involved looking at what some common medications do	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=51 (85.0%)	n=27 (77.1%)	n=17 (60.7%)	n=95 (77.2%)
No	n=9 (32.1%)	n=8 (28.6%)	n=11 (39.3%)	n=28 (22.8%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item D37: Training concerning checks performed before medication administration**

The response rate to this question was N=123 (100%). Most of the participants n=84 (68.3%) did not receive training in the last 12 months in their facilities to carry out specific checks before administering medication under special circumstances. These included pre-issue pulse recording for digoxin, regular blood pressure monitoring for residents on blood pressure medications, and

glucose monitoring for insulin. As seen in Table 4.8, the largest group (relative to the size of the group) who did not receive training to perform these pre-checks were the ENAs n=24 (85.7%).

Table 4.8 Training on checks performed before medication administration

Training re pre-checks received in the last 12 months	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=23 (38.3%)	n=12 (34.3%)	n=4 (14.3%)	n=39 (31.7%)
No	n=37 (61.7%)	n=23 (65.7%)	n=24 (85.7%)	n=84 (68.3%)
Total =N	**60**	**35**	**28**	**123 (100%)**

4.3.1.3 Variable 3: Computer training

Participants were asked whether they received formal computer training to obtain background data on the use of technology in the residential facilities for older persons. This variable will be further explored in Section 4.4.3.

- **Item E82: Formal training in computer use**

The response rate to this question was N=123 (100%). Results in Table 4.9 showed that only n=25 (20.3%) of all staff participants received formal training in the use of computers. Relative to the size of the group, the nurse category undergoing the most formal computer training was the RNs, of whom n=15 (25.0%) received formal training, versus only n=2 (7.1%) of the ENAs.

Table 4.9 Participants received formal training in computer use

Received formal computer training	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=15 (25.0%)	n=8 (22.9%)	n=2 (7.1%)	n=25 (20.3%)
No	n=45 (75.0%)	n=27 (77.1%)	n=26 (92.9%)	n=98 (79.7%)
Total =N	**60**	**35**	**28**	**123 (100%)**

4.3.1.4 Variable 4: Sources of job pressures in the workplace

Section G of the data collection instrument posed 26 questions to participants to gain insight into what the study participants perceived as job pressures.

- **Item G86: Sources of job pressures in the workplace**

Participants ranked 26 suggested sources of job pressure from 1=no pressure, 2=low pressure, 3=moderate pressure, and 4=high pressure. The response rate for this Section was N=123 (100%). The 26 job pressure items indicated a high level of internal consistency, as the Cronbach's Alpha was *a* = .911. The five highest sources of job pressures in the workplace are listed in Table 4.10. When determining the average between the categories "moderate and high", n=93 (75.6%) selected increased workloads as the highest cause of job pressure, followed by dealing with conflict in the facility n=83 (67.5%), dealing with problem residents n=82 (66.7%), paperwork n=81 (65.9%), and increased demands from residents n=77 (62.6%). It appeared that fear of assault at work caused the least job pressure, at n=12 (9.8%). A comparison between the five highest sources of job pressure for each category of nurses in the study population suggested that dealing with problem residents was the highest source of job pressure for RNs, as n=45 (36.6%), thus 75.0% of RNs, scored this as moderate or high pressure. In contrast, the increase in workloads was the highest cause of job pressure for both ENs n=25 (20.3%), thus 71.4% of ENs, and ENAs n=27 (22.0%), thus 96.4% of ENAs.

Table 4.10 Highest sources of job pressures in the workplace

Highest sources of job pressure (1-5)	**RNs, including senior RNs N=60** *(combined scores for moderate and high pressure)* **Frequency (f)**	**ENs N=35** *(combined scores for moderate and high pressure)* **Frequency (f)**	**ENAs N=28** *(combined scores for moderate and high pressure)* **Frequency (f)**	**Total of all 3 nurse categories per variable** *(combined scores for moderate and high pressure)* **N=123 (100%)**
1. Increased workloads	n=41 (33.3%)	n=25 (20.3%)	n=27 (22.0%)	n=93 (75.6%)
2. Dealing with conflict within the facility	n=37 (30.1%)	n=24 (19.5%)	n=22 (17.9%)	n=83 (67.5%)
3. Dealing with problem residents	n=45 (36.6%)	n=21 (17.1%)	n=16 (13.0%)	n=82 (66.7%)
4. Paperwork	n=42 (34.2%)	n=22 (17.9%)	n=17 (13.8%)	n=81 (65.9%)
5. Increased demands from residents	n=38 (30.9%)	n=22 (17.9%)	n=17 (13.8%)	n=77 (62.6%)
Total of 5 variables per nurse category *(Combined scores for moderate and high pressure)* **Total = N**	**203**	**114**	**99**	**N=413**

4.3.2 Section A2: Organisation infrastructures and resources

The latter part of structural measures concerned the organisational infrastructures and resources. To meet research objective *RO.2* in Chapter One (1), Section B and D included questions about participants' perceptions on the medication storage systems and MAR chart folders available in their facilities.

4.3.2.1 Variable 5: Medication storage systems

This section reflects participants' perspectives on the difficulties they experienced with their medication racking/storage systems.

- **Item D54: The medication racking/storage system presents some difficulties**

The response rate to this question was N=123 (100%). Responses to this question are captured in Table 4.11, which showed that n=67 (54.5%) did not find that the racking/storage system presented difficulties to them. Especially the RNs, as showed by n=20 (33.3%) participants, found it the least challenging (relative to the size of the group).

Table 4.11 The racking/storage system presents some difficulties

Racking/storage system presents difficulties	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
True	n=20 (33.3%)	n=15 (42.9%)	n=21 (75.0%)	n=56 (45.5%)
Untrue	n=40 (66.7%)	n=20 (57.1%)	n=7 (25.0%)	n=67 (54.5%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Items D55-D59: Difficulties participants experienced with the facility's medication racking/storage system**

Statement 7 in Section D of the data collection instrument used dichotomous questions to pose various possible difficulties with the racking/storage system to the participants. For data analysis, the five questions were grouped and displayed in Figure 4.3. The five possible difficulties posed to participants elicited a 100% response rate, N=123 (100%). In total, n=62 (50.4%) found the system bulky. More prominent issues were finding blisters, not in the right order, n=68 (55.3%) or in the wrong section of the racks, n=61 (49.6%). For clarity, as discussed in Chapter Two (2), Section 2.4.3, a blister pack refers to a bulk foil dispensing pack used by a pharmacist to pack an

individual resident's medication. The least of the problems participants experienced with their racking/storage systems was finding it difficult to pop out the tablets from the racks, n=14 (11.4%), and sustaining injuries to their fingers when opening blisters, n=10 (8.1%).

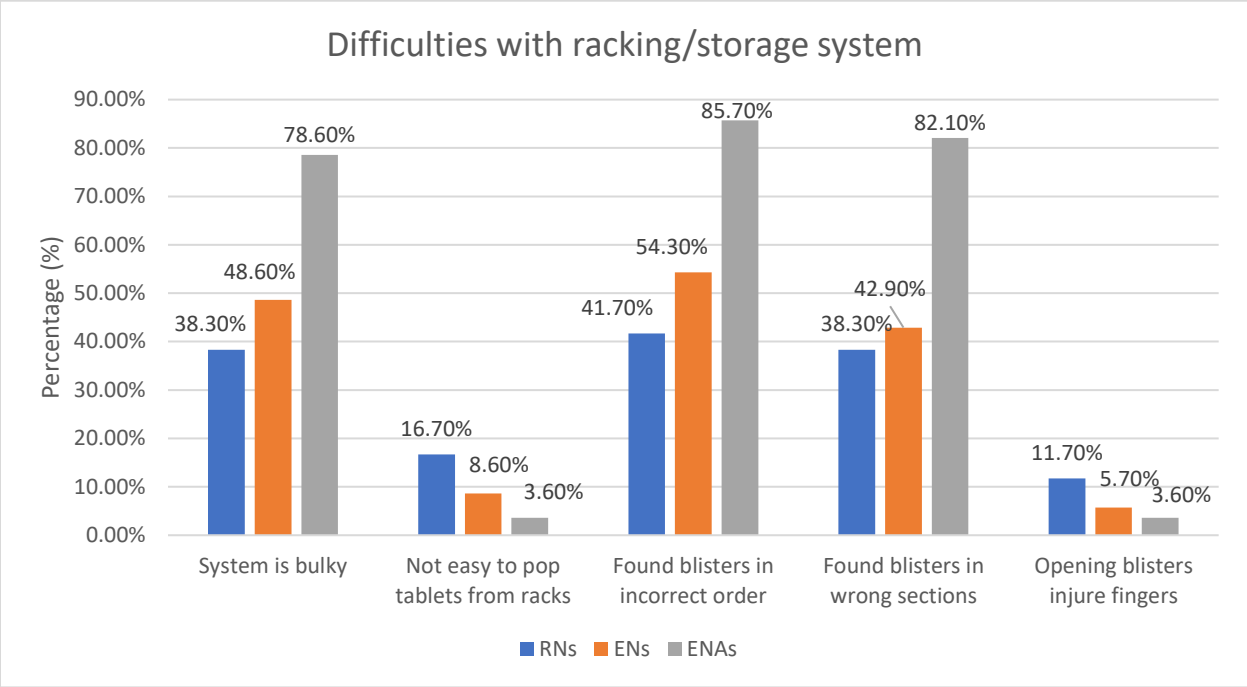

Figure 4.3 Difficulties experienced with the medication racking/storage system

4.3.2.2 Variable 6: MAR chart folders

The MAR chart folders could pose challenges for nurses as seen in the literature in Chapter Two (2), therefore participants were invited to share their opinion on challenges with the MAR chart folders.

- **Items D75-D77: Participants' opinion of MAR chart folders**

For the ease of analysis, participants' opinion on MAR chart folders in terms of whether it was bulky, easy to find residents' MAR charts in folders, or whether MAR chart holes got damaged and slide out, were combined, and displayed in Figure 4.4. The MAR chart folders as a resource in medication administration scored low in terms of difficulties that participants experienced. The combined scores of the three nurse categories finding it easy to locate residents' MAR charts in folders were n=110 (89.4%), and those finding the MAR chart folders indeed bulky were n=18 (14.8%). In both the RNs n=18 (30.3%) and ENs n=13 (37.1%) opinion the greatest challenges

with the MAR chart folders were the fact that the chart holes got damaged and charts slide out. In comparison, the results indicated that this was a challenge for only n=2 (7.1%) of the ENAs.

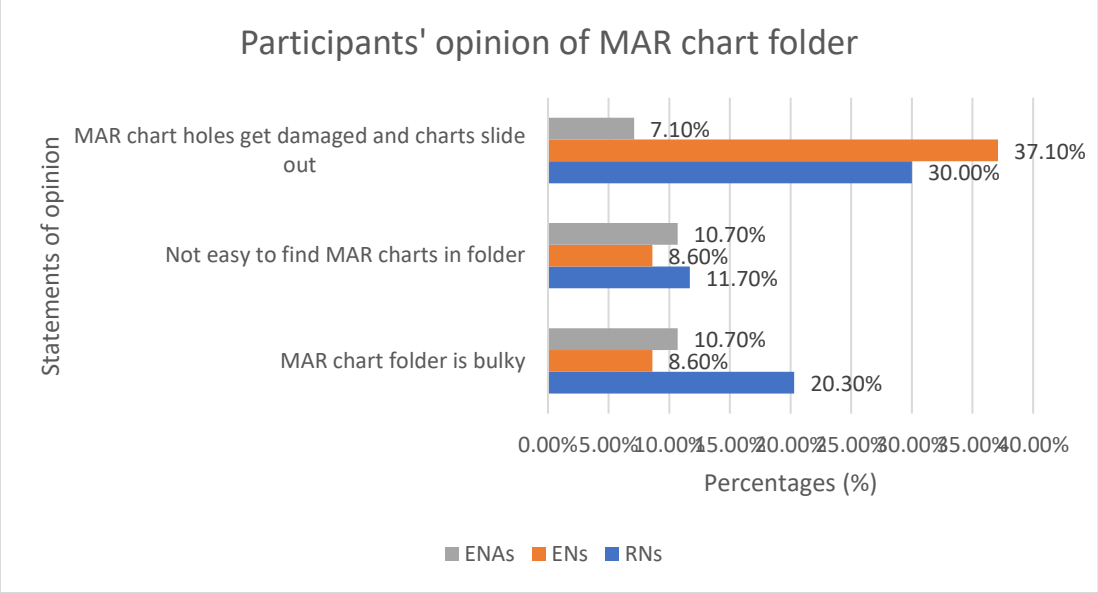

Figure 4.4 Participants' opinion of MAR chart folder

4.4 COMPONENT NO 2: PROCESS MEASURES

According to the underlying conceptual framework of this study, the second component, process measures, included legislature applicable to the phases of the medication management process, as well as the procedures followed during the administration of medication. The aim was to analyse and interpret the collected research data to address research objective *RO.3* as described in Chapter One (1), Section 1.6. These included ordering and supplying of medication, the length of medication rounds, the prevalence of multiple medications, alterations done on MARs, medication administered under special circumstances, and recordkeeping.

4.4.1 Section B1: Medication policies in facilities

Apart from legislation, medication policies guide nurses and contain prevention strategies to decrease medication-related harm. Insufficient policies to guide nurses can lead to medication errors, and lower standards of quality nursing and clinical care to the older residents. Section B included questions on whether participants had recognised medication policies in their facilities, and how often they were required to read these policies.

4.4.1.1 Variable 7: Availability of policies

Participants were requested to indicate whether they do have recognised medication policies in their facilities to guide them in the medication administration processes.

- **Item B12: The availability of recognised medication policies in facilities**

All the participants responded to this question, N=123 (100%). A total of n=105 (85.4%) participants indicated that they indeed had a recognised medication policy in their facilities to guide them, as seen in Table 4.12, whereas n=2 (1.6%) did not, and n=16 (13.0%) were unsure if there was a recognised medication policy in their facilities.

Table 4.12 Availability of medication policies in facilities

Medication policy is available in the facility	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=53 (88.3%)	n=31 (88.6%)	n=21 (75.0%)	n=105 (85.4%)
No	n=2 (3.39%)	n=0 (0.0%)	n=0 (0.0%)	n=2 (1.6%)
Not sure	n=5 (8.3%)	n=4 (11.4%)	n=7 (25.0%)	n=16 (13.0%)
Missing data (did not complete)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)
Total =N	**60**	**35**	**28**	**123 (100%)**

4.4.1.2 Variable 8: Frequency of reading policies

Following the previous question (Item B12), participants were asked for timeframes that they were required to read medication policies if they indicated they indeed had policies.

- **Item B13: Required frequency to read medication policies**

As discussed in the previous question, item (B12), n=105 (85.4%) indeed had policies available in their facilities. The n=18 (14.6%) who did not have policies available or were unsure of this fact is indicated as “not applicable” in Figure 4.5. Results showed that there were minimal requirements for nursing staff as n=34 (27.6%) were not requested to read the medication policies at any specific periods. Furthermore, with n=17 (13.8%) of participants only required to read these policies when starting at the facility, these guidelines could be doubtful in terms of medication safety, as n=42 (34.1%) already had four to nine years’ work experience, and n=34 (27.6%) had more than nine years’ work experience in residential facilities for older persons.

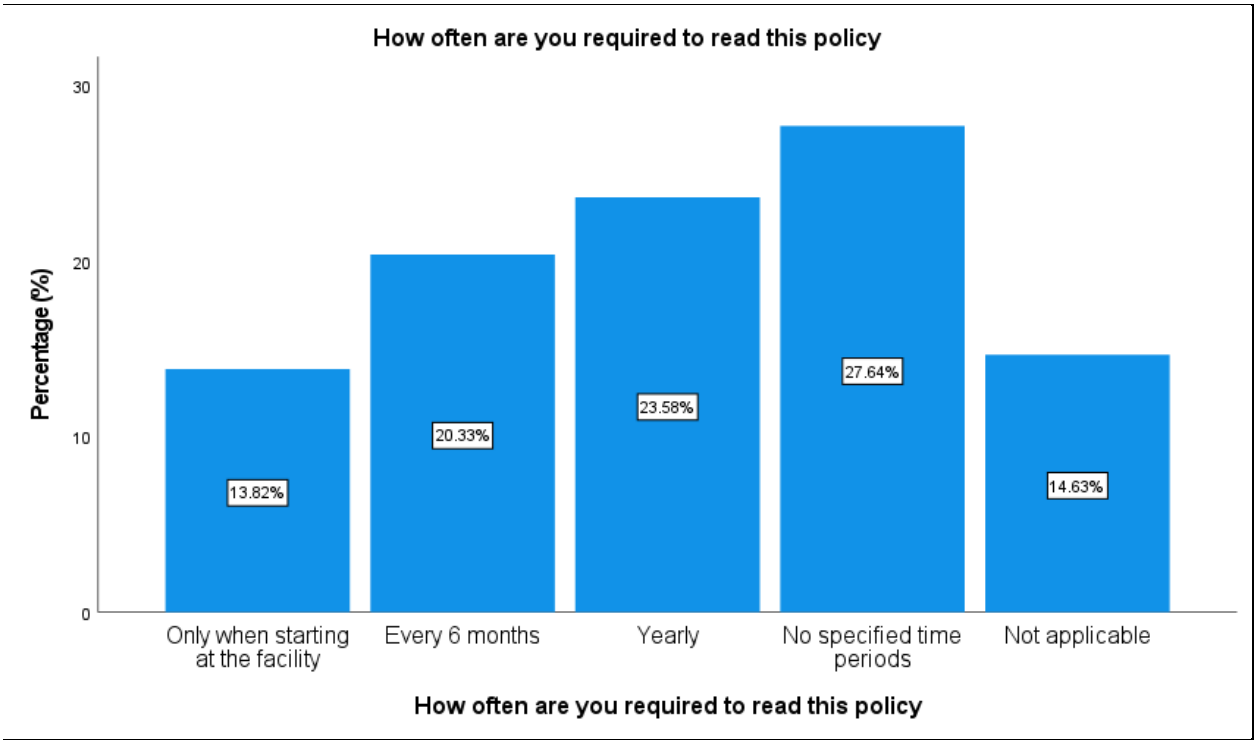

Figure 4.5 Mandatory timeframe to read medication policies

4.4.1.3 Variable 9: Storage of medication policies

Not alone is it essential for nurses to have policies to guide their actions, these policies must also be accessible to them. Data collected on the storage of these policies assisted in determining the availability of policies for the study participants.

- **Item B14: Where medication policies are kept**

Of the N=123 (100%) of study participants, n=105 (85.4%) indicated that they indeed had a recognised medication policy in their facilities as seen in the preceding question (Item B12), with an ENA, n=1 (0.8%), not answering the question as to where these policies were kept. The overall scores for medication policies kept in the frail care units, n=46 (37.7%) and the RNs office, n=43 (35.0%) was similar. A minimal total of medication policies was kept close at hand in the medication rooms for easy reference purposes, as stated by the participants who selected this option in Table 4.13, n=16 (13.1%).

Table 4.13 Where medication policies are kept

Medication policy kept	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
In medication room	n=6 (10.0%)	n=7 (20.6%)	n=3 (10.7%)	n=16 (13.1%)
In the unit (frail care)	n=21 (35.0%)	n=13 (38.2%)	n=12 (42.9%)	n=46 (37.7%)
In the RN's office	n=27 (45.0%)	n=10 (29.4%)	n=6 (21.4%)	n=43 (35.2%)
Unsure of storage	n=1 (1.7%)	n=0 (0.0%)	n=0 (0.0%)	n=1 (0.8%)
Missing data (did not complete)	n=0 (0.0%)	n=0 (0.0%)	n=1 (0.0%)	n=1 (0.8%)
Total =N	**60**	**35**	**28**	**123 (100%)**

4.4.2 Section B2: Medication management process

Safe medication administration practices require nursing staff to stay up to date concerning standard operating procedures. With the complex medication management process divided into five phases, the data collection instrument elicited answers from participants regarding the practices they followed in the workplace in each of the five phases, as discussed in Chapter Two (2).

4.4.2.1 Variable 10: Medication administration

The most questions on the data collection instrument were focused on the medication administration processes that participants followed in their facilities. This included questions regarding stock control, dispensing areas, frequency of medication administration and the length of rounds, their comfort levels of managing a drug round alone, and whether they were required to perform specific checks before administering certain medications. Also included were participants' perceptions of related risks and potential medication errors encountered.

- **Items B10-B11: Where residents' medications are dispensed from**

Figure 4.6 showed that re (Figure 4.7). Of the ENAs participating in the study, n=9 (32.1%) indicated that this was indeed so, compared to n=9 (15.0%) of RNs and n=5 (14.3%) of ENs using this system for medication administration.

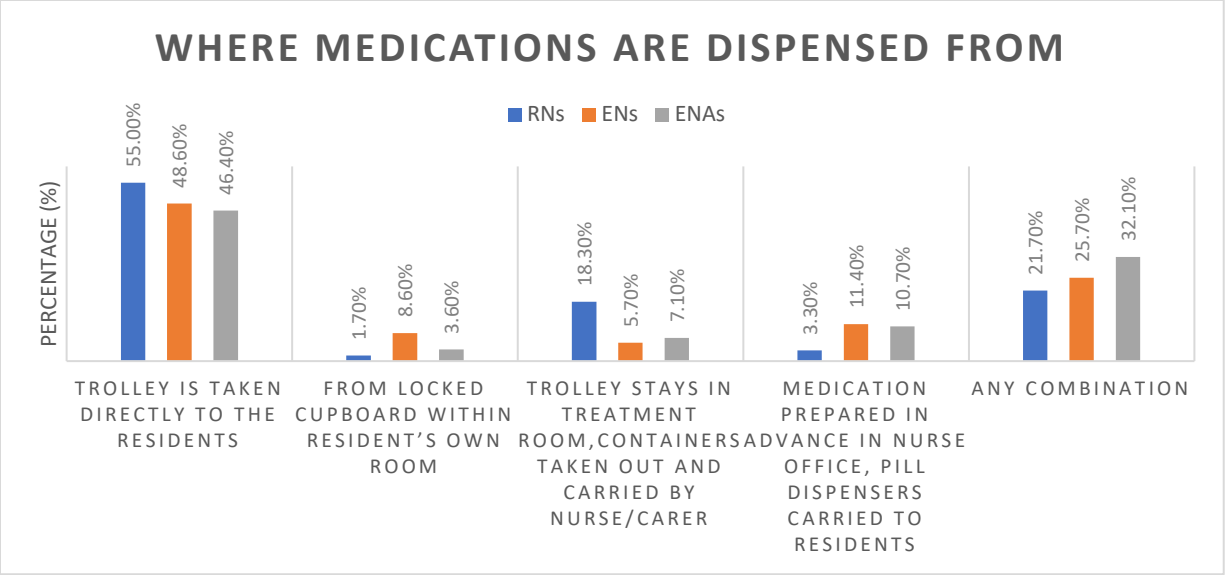

Figure 4.6 Where medications are dispensed from

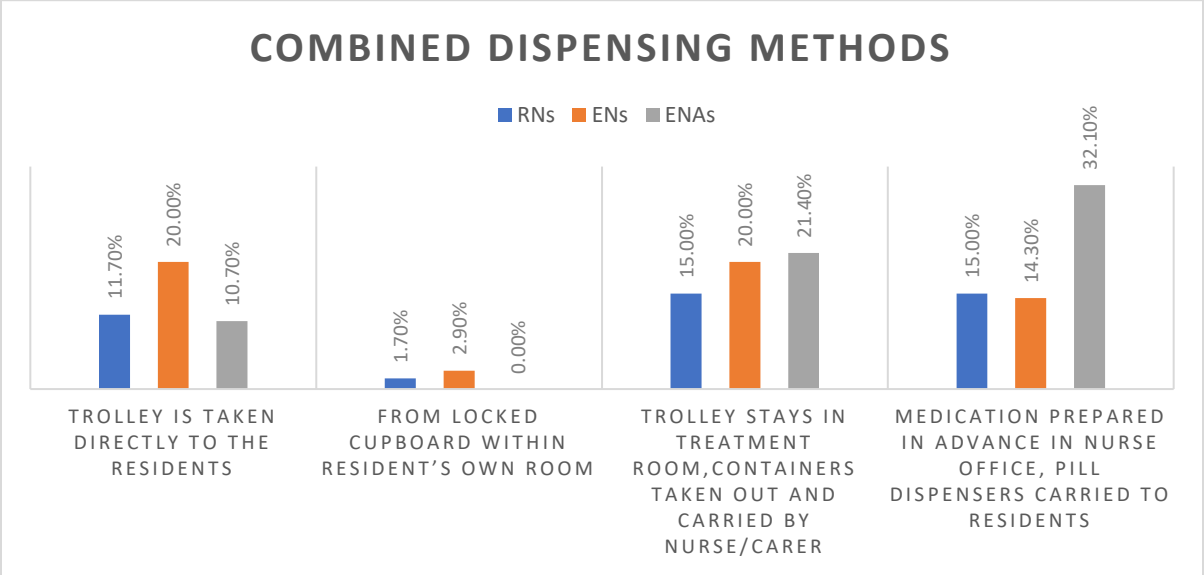

Figure 4.7 Participants using a combination of dispensing methods

- **Item B21: Knowledge on the purpose of drugs**

All the study participants answered this question, N=123 (100%). Concerning the question of whether participants knew the purpose of drugs they administered, no participants selected the option of "never" (Table 4.14). Less than half of the participants n=58 (47.2%) always knew what the purpose of the drugs was, however, all the ENAs N=28 (100%) appeared to only "sometimes" know the purpose of the drugs that they administered. As discussed in Chapter One (1), Section

1.2, ENAs are also utilised for medication administration in certain facilities, which is not aligned with their scope of practice. According to the SANC (SANC 1984:12), an auxiliary nurse/assistant (ENA) is trained to provide elementary nursing care under the supervision of the registered nurse and according to her/his scope of practice (RSA, 2005:25; SANC 1984:12). Therefore, it can be deduced that they possibly did not receive the necessary training on the purpose of drugs. A Pearson correlation coefficient was computed and indicated no correlation between when participants last received medication training and their knowledge on the purpose of drugs, r = 0.078, N=123 (100%), *p* = .392.

Table 4.14 Knowledge on the purpose of drugs

Participants know the purpose of the drugs they administer	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Always	n=42 (70.0%)	n=16 (45.7%)	n=0 (0.0%)	n=58 (47.2%)
Sometimes	n=18 (30.0%)	n=19 (54.3%)	n=28 (100%)	n=65 (52.8%)
Never	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item B22: Frequency of medication administration**

The response rate for this question was N=123 (100%). Participants' responses suggested that there was a greater utilisation of a lower category of nursing staff during night shifts. Table 4.15 reflected that the RNs and ENs administered most of the medications during the day shifts, and seldom during night shifts. At night, only n=4 (6.7%) of RNs, and n=4 (11.4%) of ENs administered medication, which correlated with the responses of the ENAs, where n=9 (32.1%) indicated that they administered medication during most night shifts per week, as well as n=7 (25.0%) who administered in emergencies, when staff shortages occurred, as well as some night shifts per week.

Table 4.15 Frequency of medication administration

Participant response to the frequency of medication administration	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
9-12 rounds per week (during most day shifts per week)	n=38 (63.3%)	n=24 (68.6%)	n=6 (21.4%)	n=68 (55.3%)
4-8 rounds per week (during some of the day shifts per week)	n=7 (11.7%)	n=6 (17.1%)	n=6 (21.4%)	n=19 (15.4%)
3-4 rounds per week (during most night shifts per week)	n=4 (6.7%)	n=4 (11.4%)	n=9 (32.1%)	n=17 (13.8%)
1-3 rounds per week (only when needed e.g., in emergencies, staff shortages, and some night shifts per week)	n=11 (18.3%)	n=1 (2.9%)	n=7 (25.0%)	n=19 (15.4%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Items B26-B28: Length of medication rounds**

The response rate to the question of approximately how long drug rounds took in the morning, at teatime, lunchtime, and in the evening, was N=123 (100%). As displayed in Figure 4.8, most participants n=94 (76.4%) indicated that their **morning** rounds took >30 minutes – ≤ 1 hour, whereas n=100 (81.3%) stated **lunch** rounds were less than 30 minutes. For **evening** rounds, n=76 (61.8%) selected a similar time as the morning rounds, >30 minutes – ≤ 1 hour. Only n=2 (1.6%) indicated that the morning round took more than two hours. None of the participants indicated that the medication rounds took more than two hours at lunch or in the evening. Despite the morning and evening rounds being the most time consuming, the night rounds (three to four rounds per week) were more frequently performed by ENAs (relative to the size of the group), n=9 (32.1%) than by RNs, n=4 (6.7%) and ENs, n=4 (11.4%), when compared to the responses of participants of the frequency of medication administration in Item B22.

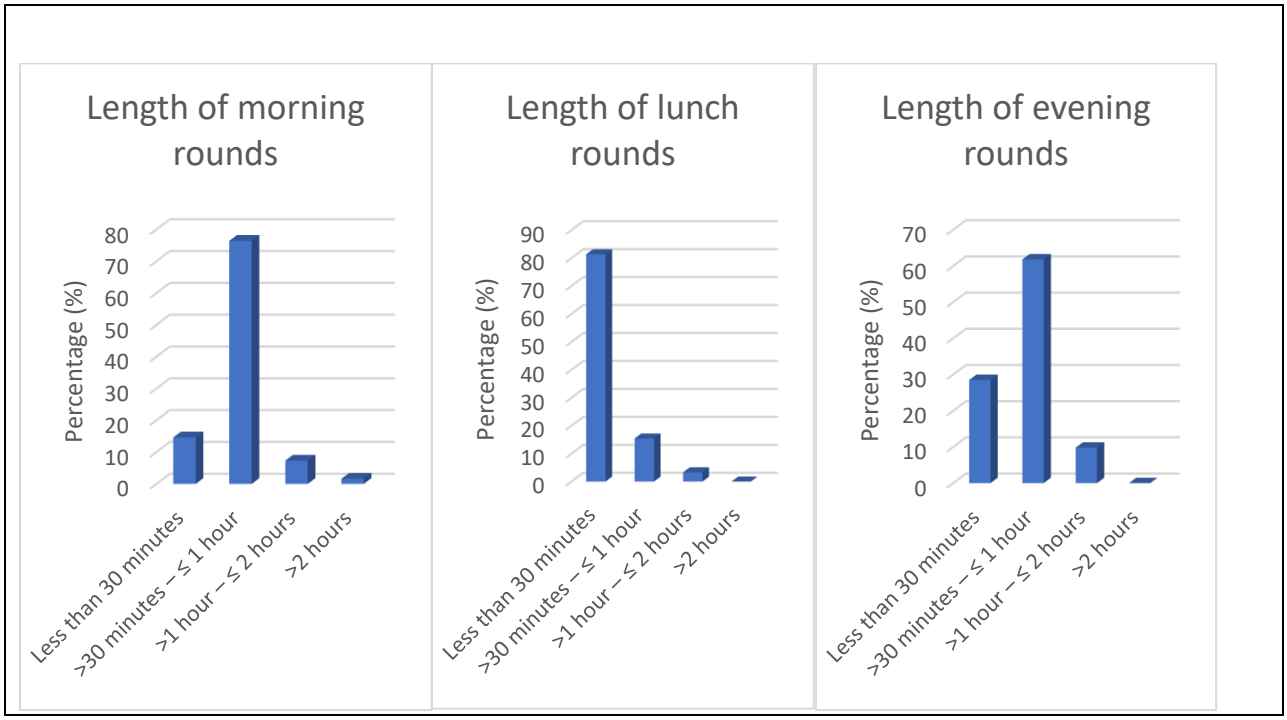

Figure 4.8 Length of medication rounds

- **Item B29: Potential medication error: "near misses"**

Of the N=123 (100%) participants, n=50 (40.7%) had seen incidences of "near misses" in their facilities where a medication error almost occurred but the administrator had noticed just in time. According to the results presented in Table 4.16, RNs n=29 (48.3%) and ENs n=16 (45.7%) had a higher awareness of "near misses" than the ENAs, of whom only n=5 (17.9%) had seen incidences of "near misses".

Table 4.16 Participants' awareness of "near misses"

Participants awareness of "near misses"	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=29 (48.3%)	n=16 (45.7%)	n=5 (17.9%)	n=50 (40.7%)
No	n=31 (51.7%)	n=19 (54.3%)	n=23 (82.1%)	n=73 (59.3%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item B30: Completing drug rounds alone**

All study participants responded to this question, N=123 (100%). The results obtained indicated that, relative to the size of the nurse category, more ENAs, n=23 (82.1%), carried drug rounds out alone than either the RNs, n=46 (76.7%) and ENs, n=21 (60.0%). This corresponded with the data analysis from the previous questions (Item B22 and Items B26-B28), indicating more ENAs administered medication during the evening rounds, as shown in Table 4.17.

Table 4.17 Participants carrying out drug rounds alone

Participants responses whether they carry out a drug round alone	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=46 (76.7%)	n=21 (60.0%)	n=23 (82.1%)	n=90 (73.2%)
No	n=14 (23.3%)	n=14 (40.0%)	n=5 (17.9%)	n=33 (26.8%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item B31: Comfort levels of carrying out drug rounds alone**

This question elicited a 100% (N=123) response rate from study participants. The results assessing participants' comfort levels of carrying out drug rounds alone indicated that n=35 (58.3%) of RNs were extremely at ease, while ENs n=15 (42.9%) and ENAs n=21 (75.0%) were fairly at ease. Table 4.18 showed that a minority of n=8 (6.5%) was not at ease at all. A Spearman's rank-order correlation test was performed to determine the relationship between how comfortable participants were with carrying out drug rounds alone and their years' work experience. There was not a significant linear correlation between comfort levels and years' work experience ($r = .027$, $p = .765$).

Table 4.18 Comfort levels of carrying out drug rounds alone

How at ease participants are with carrying out a drug round on their own	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Not at ease at all	n=4 (6.7%)	n=4 (11.4%)	n=0 (0.0%)	n=8 (6.5%)
Somewhat uneasy	n=1 (1.7%)	n=2 (5.7%)	n=4 (13.3%)	n=7 (5.7%)
Fairly at ease	n=20 (33.3%)	n=15 (42.9%)	n=21 (75.0%)	n=56 (45.5%)
Extremely at ease	n=35 (58.3%)	n=14 (40.0%)	n=3 (10.7%)	n=52 (42.3%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item B32: Pitfalls/problems associated with current methods of medication stock control**

Participants could select any of the posed options. It was clear from Figure 4.9 that for n=88 (71.5%) of participants, the most challenging problem associated with their facility's methods of stock control was that it was time-consuming. The relatively low percentage of participants that selected the option of "easy to make a mistake" was encouraging when looking at medication safety.

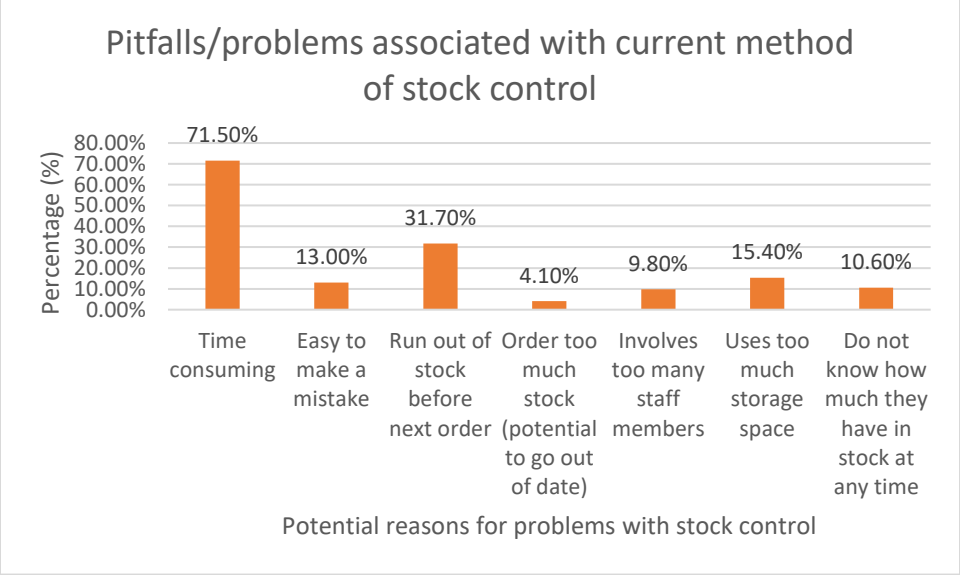

Figure 4.9 Pitfalls/problems associated with the current method of medication stock control

- **Item D36: Checks performed before medication administration**

It would appear from the results displayed in Figure 4.10 that participants focused mainly on performing glucose monitoring before administering insulin n=118 (95.9%). n=48 (39.0%) of participants were not required to monitor blood pressures for those on blood pressure medications before administering, and n=74 (60.2%) indicated that they did not have to do pre-issue pulse recording for Digoxin in their facilities. A statistically significant difference was found (p = <.001) between performing pulse checks and whether participants received training in the carrying out of these checks when using the Spearman's Rho 2-Tailed statistical test (correlation coefficient .409). Likewise, the statistically significant difference between monitoring blood pressure before administering blood pressure medication and whether participants received training in the carrying out of these checks indicated a correlation coefficient of .187 and p = .038.

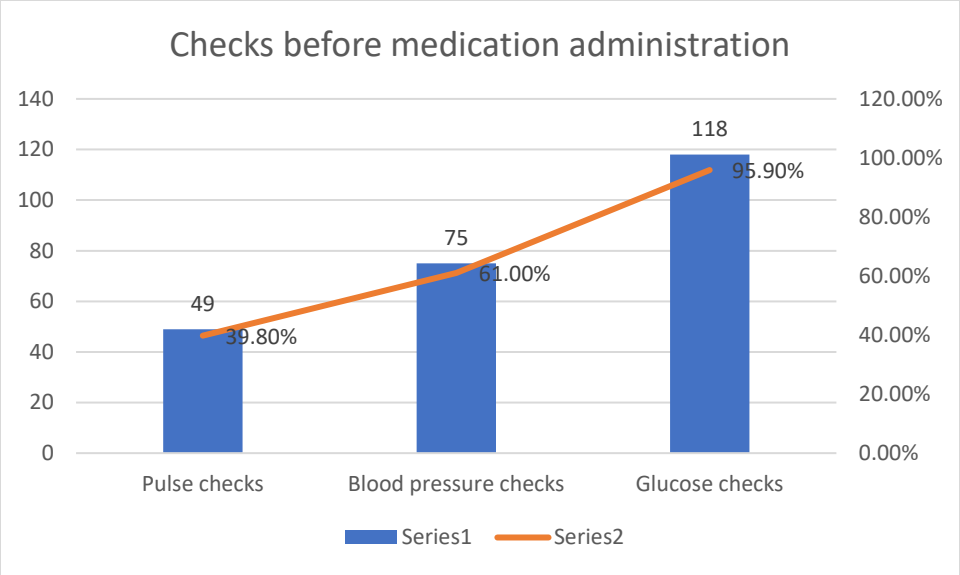

Figure 4.10 Checks performed before medication administration

- **Item D38: Risk when assuming the content of blister containers are correct without thorough checking**

This question elicited a 100% (N=123) response rate from study participants. Of the participants, n=84 (68.3%) believed, it was untrue in their facilities that staff administering medications would assume that the content of the blisters/containers would be correct and did not need thorough checking. However, of the ENAs, relative to the size of the group, more than half, n=15 (53.6%), agreed with statement 1 on the data collection instrument that it was true in their facilities (Table 4.19).

Table 4.19 Risk when assuming the content of blisters/containers are correct without thorough checking

Content of blisters is correct in their facility, therefore thorough checking not needed	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
True	n=14 (23.3%)	n=10 (28.6%)	n=15 (53.6%)	n=39 (31.7%)
Untrue	n=46 (76.7%)	n=25 (71.4%)	n=13 (46.4%)	n=84 (68.3%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D39: Potential medication error: incorrect content of blisters/containers**

The response rate to this question was N=123 (100%). It would appear from the results in Table 4.20 that a high percentage of participants, n=102 (82.9%), came across situations where staff assumed that the content of the blisters/containers was correct and therefore did not need checking thoroughly, however, the content of blisters/containers was indeed wrong. All three nurse categories have come across blisters/containers with the wrong content, relative to the group size, the ENAs had the highest frequency of n=27 (96.4%), then the RNs n=48 (80.0%) and the ENs n=27 (77.1%). The mean score was 1.17 with a standard deviation of .378.

Table 4.20 Participants' awareness of incorrect content of blisters/containers

Participants came across situations where the content of blisters/containers was wrong	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=48 (80.0%)	n=27 (77.1%)	n=27 (96.4%)	n=102 (82.9%)
No	n=12 (20.0%)	n=8 (22.9%)	n=1 (3.6%)	n=21 (17.1%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D40: Participants' perceptions of the thoroughness of checking the content of blisters/containers**

All the study participants responded to this question, N=123 (100%). Table 4.21 showed that many participants, n=95 (77.2%) believed staff administering medications assumed that the content of the blisters/containers was correct and therefore did not make thorough checks. The nurse category (relative to the size of the nurse category) that made these assumptions the most was the ENAs, where n=25 (89.3%) believed that staff assumed the content of blisters/containers was correct.

Table 4.21 Perception of the thoroughness of checking the content of blisters/containers

Participants agree that some people do not make thorough checks	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=47 (78.3%)	n=23 (65.7%)	n=25 (89.3%)	n=95 (77.2%)
No	n=13 (21.7%)	n=12 (34.3%)	n=3 (10.7%)	n=28 (22.8%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D41: Risk of assuming blisters/containers are up to date without thorough checking**

This question elicited a 100% (N=123) response rate. According to the scores in the table below (Table 4.22), more than half of the participants, n=64 (52.0%), found it true that staff in their facilities would assume that the blisters/containers on the racks were up to date (i.e., no one has taken any off or added any on). This could lead to blisters/containers not being thoroughly checked. Relative to the group size, the ENs were the nurse category that disagreed with this statement the most, as n=20 (57.1%) found this untrue for their facilities.

Table 4.22 Risk of assuming blisters/containers are up to date without thorough checking

Staff assume that blisters/containers on racks are up to date	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
True	n=30 (50.0%)	n=15 (42.9%)	n=19 (67.9%)	n=64 (52.0%)
Untrue	n=30 (50.0%)	n=20 (57.1%)	n=9 (32.1%)	n=59 (48.0%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D42: Potential medication error: out of date blisters/containers**

The response rate for this question was 100% (N=123). In terms of participants who came across situations where blisters/containers were not up to date, for example, some were removed or added on, only n=30 (24.4%) denied that they had seen this occurrence, including RNs, n=17 (28.3%). In contrast, n=93 (75.6%) participants confirmed that staff assumed that the blisters/containers on the racks were up to date although they had indeed seen blisters not up to

date. Relative to the size of the nurse category, the ENAs observed this the most frequently, as indicated in Table 4.23 by n=26 (92.9%) participants.

Table 4.23 Participants' awareness of out of date blisters/containers

Participants came across out of date blisters/containers	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=43 (71.7%)	n=24 (68.6%)	n=26 (92.9%)	n=93 (75.6%)
No	n=17 (28.3%)	n=11 (31.4%)	n=2 (7.1%)	n=30 (24.4%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D43: Participants' perceptions of the thoroughness of checks about whether blisters/containers are up to date**

Of the N=123 (100%) participants, n=92 (74.8%) believed that staff assumed that the blisters/containers on the racks were up to date (i.e., no one has taken any off or added any on). These perceptions of participants regarding the thoroughness of checks are displayed in Table 4.24. A Pearson Chi-square test of independence was computed to determine if there was an association between the participants' perceptions of the thoroughness of checks about the *content* of blisters (Item D40) and whether blisters/containers *are up to date*. The data suggested that there was indeed a significant association, with $p = <.001$.

Table 4.24 Perceptions of the thoroughness of checks about whether blisters/containers are up to date

Participants agree that some people do not make thorough checks	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=43 (71.7%)	n=24 (68.6%)	n=25 (89.3%)	n=92 (74.8%)
No	n=17 (28.3%)	n=11 (31.4%)	n=3 (10.7%)	n=31 (25.2%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D44: Risk of assuming blisters/containers are in correct residents' sections without thorough checking**

Responses to this question were N=123 (100%). These responses were captured in Table 4.25, which showed that more than half of all participants in all three nurse categories found it to be true that staff assumed that the blisters/containers on the racks were placed in the correct

residents' section. With the possibility of making medication errors because of assuming medication was placed in the correct residents' section, it was disconcerting to see that n=80 (65.0%) of participants agreed with this statement.

Table 4.25 Risk of assuming blisters/containers are in correct residents' sections without thorough checking

Staff assume that blisters/containers on racks are in the correct residents' section	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
True	n=41 (68.3%)	n=21 (60.0%)	n=18 (64.3%)	n=80 (65.0%)
Untrue	n=19 (31.7%)	n=14 (40.0%)	n=10 (35.7%)	n=43 (35.0%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D45: Blisters/containers placed in wrong residents' sections**

The response rate to this question was N=123 (100%). For this question, all three nurse categories had come across situations where the blisters/containers were wrong as they were not placed in the correct residents' section (Table 4.26). The ENAs, relative to the size of the group, scored this event that could lead to a potential medication error the highest, as shown by n=26 (92.9%). When using a Spearman's rank-order correlation test, there was a strong positive, significant correlation between finding the storage system difficult concerning blisters that were found in wrong sections of the racks, and participants who had indeed come across situations where the blisters/containers were wrong when administering medications (r = .424, p = <001).

Table 4.26 Participants' awareness of blisters in wrong residents' sections

Participants came across blisters/containers in the wrong residents' section	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=38 (63.3%)	n=23 (65.7%)	n=26 (92.9%)	n=87 (70.7%)
No	n=22 (36.7%)	n=12 (34.3%)	n=2 (7.1%)	n=36 (29.3%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D46: Participants' perceptions of the thoroughness of checks about whether blisters/containers are in the correct residents' section**

This question elicited a 100% (N=123) response rate. Some people did not make thorough checks according to n=92 (74.8%) of participants, as demonstrated in Table 4.27, as staff assumed the

blisters/containers on the racks were placed in the correct residents' section. Since this could lead to potential medication errors, the relatively small total of staff that did not make these assumptions, and would consequently check whether blisters or containers were indeed in the correct residents' section, only amounted to n=31 (25.2%) of the study population.

Table 4.27 Perceptions of the thoroughness of checks whether blisters/containers are in the correct residents' section

Participants agree that some people do not make thorough checks	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=43 (71.7%)	n=25 (71.4%)	n=24 (85.7%)	n=92 (74.8%)
No	n=17 (28.3%)	n=10 (28.6%)	n=4 (14.3%)	n=31 (25.2%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D47: Risk of missing interim medications supplied mid-month and placed in incorrect positions on racks**

Interim medications that could be supplied mid-month and placed in incorrect positions on racks could be missed out of the normal drug administration system. However, it was evident from the responses that RNs, n=16 (26.7%), and ENs, n=9 (25.7%) perceived this not as a risk in their facilities, as seen in Table 4.28. The ENAs, n=14 (50.0%), perceived this as an equal probability that these medications could be missed or not. The response rate to this question was 100% (N=123).

Table 4.28 Risk of missing interim medications supplied mid-month and placed in incorrect positions on racks

Participants see this as a risk in their facility	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=16 (26.7%)	n=9 (25.7%)	n=14 (50.0%)	n=39 (31.7%)
No	n=44 (73.3%)	n=26 (74.3%)	n=14 (50.0%)	n=84 (68.3%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D48: Potential medication error: interim medications supplied mid-month being missed due to placing in incorrect positions on racks**

This question elicited a 100% (N=123) response rate. Responses to this question were captured in Table 4.29, which showed that n=40 (32.5%) participants had seen interim medicines being missed when supplied mid-month and blisters/containers not placed on the racks in the correct position. However, most participants, n=83 (67.5%), had not seen this medication error.

Table 4.29 Participants' awareness of interim medications supplied mid-month being missed due to placing in incorrect positions on racks

Participants have seen interim medicines missed	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=14 (23.3%)	n=10 (28.6%)	n=16 (57.1%)	n=40 (32.5%)
No	n=46 (76.7%)	n=25 (71.4%)	n=12 (42.9%)	n=83 (67.5%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D49: Participants' perceptions of the thoroughness of storing interim medicines supplied mid-month in correct positions on racks**

An analysis of participants' observations, as shown in Table 4.30, indicated whether they had seen interim medicines that were supplied in the middle of the month in incorrect positions on the racks. Of the participants, n=59 (48.0%) had indeed observed interim medicines on racks in incorrect positions and as a result, there was a risk of them getting missed out of the normal drug administration system. The response rate to this question was 100% (N=123).

Table 4.30 Perceptions of the thoroughness of storing interim medicines supplied mid-month in correct positions on racks

Participants came across blisters/containers on the racks in incorrect positions	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=19 (31.7%)	n=16 (45.7%)	n=24 (85.7%)	n=59 (48.0%)
No	n=41 (68.3%)	n=19 (54.3%)	n=4 (14.3%)	n=64 (52.0%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D50: Risk of missing unblistered medicines supplied mid-month and stored elsewhere**

This question elicited a 100% (N=123) response rate. The overall score of n=45 (36.6%), as displayed in Table 4.31, suggested that participants saw the missing of interim medications that were supplied mid-month to residents, and as a result not blistered and stored elsewhere such as in the fridge, not as a risk.

Table 4.31 Risk of missing unblistered medicines supplied mid-month and stored elsewhere

Participants see this as a risk in their facility	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=19 (31.7%)	n=10 (28.6%)	n=16 (57.1%)	n=45 (36.6%)
No	n=41 (68.3%)	n=25 (71.4%)	n=12 (42.9%)	n=78 (63.4%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D51: Potential medication error: interim medications supplied mid-month being missed when stored elsewhere**

All the study participants responded to this question, N=123 (100%). An analysis of the responses to statement 5 on the data collection instrument where participants were asked whether they had seen interim medicines being missed as they were supplied mid-month and therefore not blistered and possibly stored elsewhere, is displayed in Table 4.32. Most of the participants, n=77 (62.6%), had not seen medication being missed under these circumstances. In contrast, the ENAs appeared to have seen this medication error the most, as n=18 (64.3%) indicated they had indeed seen medication being missed under these circumstances. With further statistical analysis, the Pearson Chi-Square test of independence indicated a p = <.001, suggesting a significant association between participants perceiving it a risk in their facilities and declaring they had seen in their facilities that medication was missed due to interim medicines supplied mid-month and therefore not blistered and possibly stored elsewhere (Item D50).

Table 4.32 Participants' awareness of interim medications supplied mid-month being missed when stored elsewhere

Participants have seen medicines missed due to not being blistered	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=20 (33.3%)	n=8 (22.9%)	n=18 (64.3%)	n=46 (37.4%)
No	n=40 (66.7%)	n=27 (77.1%)	n=10 (35.7%)	n=77 (62.6%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D52: Risk of incorrect medication administration due to not adding or removing the blisters/containers when dose changes occur**

This question elicited a 100% (N=123) response rate. The analysis of responses to this question suggested that participants, n=67 (54.5%), saw it as a higher than average risk in their facilities when blisters/containers remained on the racks, although changes did occur (Table 4.33). Relative to the size of the groups, especially the RNs n=35 (58.3%) and ENAs n=16 (57.1%) perceived it as a risk when blisters/containers were not removed or added because of dose changes.

Table 4.33 Risk of incorrect medication administration due to not adding or removing the blisters/containers when dose changes occur

Participants see this as a risk in their facilities	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
True	n=35 (58.3%)	n=16 (45.7%)	n=16 (57.1%)	n=67 (54.5%)
Untrue	n=25 (41.7%)	n=19 (54.3%)	n=12 (42.9%)	n=56 (45.5%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D53: Potential medication error: Incorrect medication administration due to not adding or removing the medication from the blisters/containers when dose changes occurred**

This question also elicited a 100% (N=123) response rate. Potential risk can occur by not administering medications properly due to dose changes made, but the removal of the redundant

medication or adding additional doses to the blisters/containers did not occur. Relative to the group size, the ENs, as seen in Table 4.34, n=17 (48.6%) came across these situations slightly less frequently than the other nurse categories, with a total of n=69 (56.1%) participants that had seen this. A Pearson correlation test was computed to assess the relationship between medication errors seen by participants in the facility where the wrong dosage was given to residents (B16), and where a wrong dose was given to residents as a result of not removing redundant medication or adding additional doses as prescribed. There was no significant correlation between the two variables, as the p-value of p = .091 indicated.

Table 4.34 Participants' awareness of incorrect medication administration due to not adding or removing the medication from the blisters/containers when dose changes occurred

Participants came across where changes were not made	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=30 (50.0%)	n=17 (48.6%)	n=22 (78.6%)	n=69 (56.1%)
No	n=30 (50.0%)	n=18 (51.4%)	n=6 (21.4%)	n=54 (43.9%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D60: Risk of residents missing medicines if absent during medication rounds**

The results measuring the risk that residents could miss their medication during a round when they were absent when it was their turn, showed that more than half of the participants, n=64 (52.0%), perceived this as a viable risk in their facilities. Relative to the group size, only n=7 (25.0%) of ENAs indicated that this was not a risk, as indicated in Table 4.34. There was no missing data in the responses to this question, N=123 (100%).

Table 4.35 Risk of residents missing medicines if absent during medication rounds

Risk of missing medication due to absenteeism	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
True	n=27 (45.0%)	n=16 (45.7%)	n=21 (75.0%)	n=64 (52.0%)
Untrue	n=33 (55.0%)	n=19 (54.3%)	n=7 (25.0%)	n=59 (48.0%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D61: Potential medication error: residents missing medicines while absent during medication rounds**

All study participants answered this question, N=123 (100%). The participants, n=57 (46.3%), responded to statement 8 on the data collection instrument as *"yes",* they had indeed seen residents not receiving medicines due to them not being there during the medicine round when it was their turn. This appeared to be a risk, especially for the ENAs, who indicated that n=22 (78.6%) had seen medicines missed under these circumstances, as displayed in Table 4.36. With further data analysis using the Pearson Chi-square test of independence, it indicated that there was no significant association between medication errors seen by participants in their facilities where medication was missed altogether (question B16) and seeing residents who missed their medications while absent during medication rounds (p = .240).

Table 4.36 Participants' awareness of residents missing medicines while absent during medication rounds

Participants have seen medicines missed when residents are absent during rounds	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=19 (31.7%)	n=16 (45.7%)	n=22 (78.6%)	n=57 (46.3%)
No	n=41 (68.3%)	n=19 (54.3%)	n=6 (21.4%)	n=66 (53.7%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D62: Preventive methods applied when residents are absent during medication rounds**

This question also elicited a 100% (N=123) response rate. When analysing the responses of participants to the question of which methods they used to prevent residents from missing medicines when they were not there when it was their turn, no participants n=0 (0.0%) selected the option *"no prompt required"* (Table 4.37). Relative to the group size, the ENAs appeared to favour writing on a notepad to remember, as n=21 (75.0%) selected this option, opposed to the ENs n=30 (85.7%) and RNs n=45 (75.0%) who chose to check blisters/containers at the end of a round as their preferred preventative method for missing administering a resident's medication.

Table 4.37 Preventive methods applied when residents are absent during medication rounds

Preventative methods	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Make a note on the MAR	n=14 (23.3%)	n=2 (5.7%)	n=2 (7.1%)	n=18 (14.6%)
Check blisters/ containers at end of round	n=45 (75.0%)	n=30 (85.7%)	n=12 (42.9%)	n=87 (70.7%)
Write on notepad	n=27 (45.0%)	n=15 (42.9%)	n=21 (75.0%)	n=63 (51.2%)
No prompt required	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D66: Participants' perception of the reasons for sharing residents' medicines**

Participants had the option to multi-select from the provided choices as a response to this question and they all answered, N=123 (100%). The highest score of n=103 (83.7%) indicated that medication ran out, therefore creating a need to share other residents' medication. Although this was suggestive of problems associated with stock control methods, a Pearson Chi-square test was computed (p = .481) and showed no significant association between participants' perception that medications had to be shared because residents' medication ran out, and participants' perceptions that a problem associated with their current method of medication stock control was that stock ran out before the next order (Item B32). For the ENAs and relative to the size of the group, n=11 (39.3%), the second most important reason was that there was not enough room on the trolley, as seen in Figure 4.11.

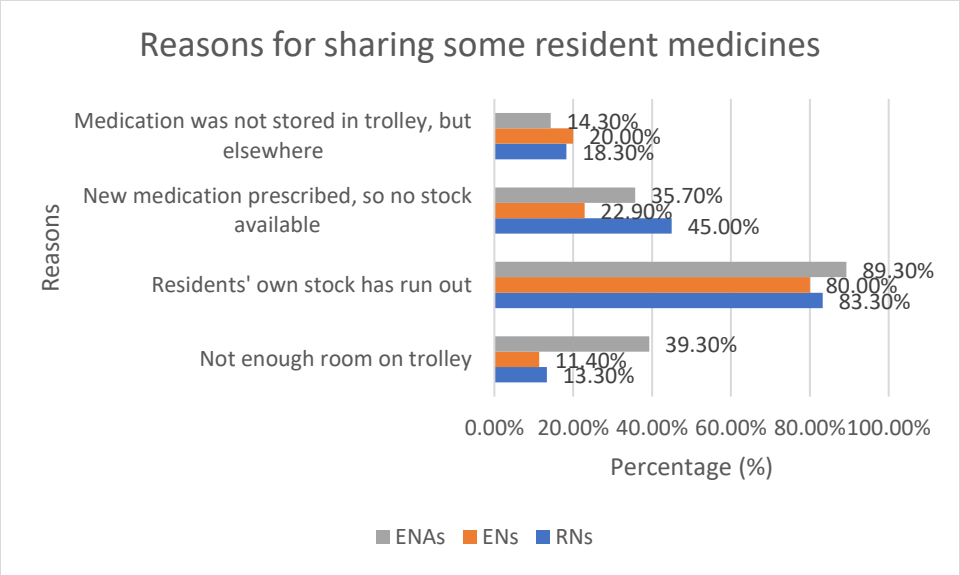

Figure 4.11 Participants' perception of the reasons for sharing residents' medicines

- **Item D67: Medication error: sharing residents' medicines**

This question was answered by all study participants, N=123 (100%). The Pearson Chi-square test identified a statistical difference (p = .002) between the nurse categories and how often they saw the practice of sharing. In Table 4.38, more than half of the participants, n=64 (52.0%), saw this practice of sharing medicines fairly frequently, with only n=6 (4.9%) who had never seen this happen. Relative to the group size, it appeared that especially the ENAs, n=24 (85.7%), saw this practice fairly frequently, compared to both the RNs that saw this slightly more rarely n=26 (43.3%) than fairly frequently n=25 (41.7%) and the ENs that also saw it slightly more rarely n=18 (51.4%) than fairly frequently n=15 (42.9%).

Table 4.38 Participants' awareness of sharing residents' medicines

Participants have seen the practice of sharing	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Frequently	n=4 (6.7%)	n=2 (5.7%)	n=0 (0.0%)	n=6 (4.9%)
Fairly frequently	n=25 (41.7%)	n=15 (42.9%)	n=24 (85.7%)	n=64 (52.0%)
Rarely	n=26 (43.3%)	n=18 (51.4%)	n=3 (10.7%)	n=47 (38.2%)
Never	n=5 (8.3%)	n=0 (0.0%)	n=1 (3.6%)	n=6 (4.9%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D71: Risk of missing medicines when residents have multiple MARs**

It was pleasant to see that n=80 (65.0%) of participants scored the risk of residents missing medicines in their facilities due to having multiple MARs, and additional interim MARs placed at the back of existing sheets, as an incident that would rarely happen. The combined score of this event happening frequently or fairly frequently was n=23 (18.7%), as seen in Table 4.39. This question also elicited a 100% (N=123) response rate.

Table 4.39 Risk of missing medicines when residents have multiple MARs

Seen medications being missed due to multiple MARs plus interim MAR sheet	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Frequently	n=1 (1.7%)	n=0 (0.0%)	n=0 (0.0%)	n=1 (0.8%)
Fairly frequently	n=13 (21.7%)	n=7 (20.0%)	n=2 (7.1%)	n=22 (17.9%)
Rarely	n=37 (61.7%)	n=22 (62.9%)	n=21 (75.0%)	n=80 (65.0%)
Never	n=9 (15.0%)	n=6 (17.1%)	n=5 (17.9%)	n=20 (16.3%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D72: Methods implemented to verify medication changes after days off**

When providing participants with the choice to select any of the options that apply, no participants n= 0 (0.0%) selected the option of “asking residents” to inform them about medication changes after being off duty for a few days. More than half of the RNs n=40 (66.7%) studied the MAR charts to inform themselves, as well as n=18 (51.4%) of the ENs, although only n=2 (7.1%) of ENAs followed this method to verify medication changes after being off duty for a few days. It appeared that the preferred method for all three categories of nurses to inform themselves of medication changes were via a discussion with colleagues, as n=104 (84.6%) indicated this (Table 4.40). Further exploration of this trend is needed to determine if this verbal communication method is associated with medication safety.

Table 4.40 Methods implemented to verify medication changes after days off

How participants inform themselves about medication changes (1-3)	RNs, including senior RNs N=60 Frequency (f)	ENs N=35 Frequency (f)	ENAs N=28 Frequency (f)	Total of all 3 nurse categories per variable N=123 (100%)
1. Study MAR charts	n=40 (66.7%)	n=18 (51.4%)	n=2 (7.1%)	n=60 (48.8%)
2. Discuss with colleagues	n=49 (81.7%)	n=27 (77.1%)	n=28 (100.0%)	n=104 (84.6%)
3. Ask residents	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)
Total of all 3 variables per nurse category Total = N	**89**	**45**	**30**	**N=164**

4.3.1.1 Variable 11: Recordkeeping

As the last phase in the medication administration process, recordkeeping errors can reflect errors of medication accountability. It is therefore important to gain insight into procedures followed by participants in their facilities, hence these questions on the data collection instrument.

- **Item C33: Alterations to MAR sheets**

An analysis of who can make changes to the MAR sheets, e.g., dosage changes, discontinuation of medication etc., is displayed in Table 4.41. Participants could select any of the choices that applied, namely RNs, ENs, ENAs and/or doctors. Within the facility, only n=76 (61.8%) of participants assigned this responsibility to a registered nurse. In contrast, n=11 (18.3%) of the RNs and n=8 (22.9%) of ENs believed that enrolled nurses also had this level of accountability and responsibility.

Table 4.41 Who may make changes to the MAR

People who may make changes to the MAR (1-4)	RNs, including senior RNs N=60 Frequency (f)	ENs N=35 Frequency (f)	ENAs N=28 Frequency (f)	Total of all 3 nurse categories per variable N=123 (100%)
1. Registered nurses	n=40 (66.7%)	n=19 (54.3%)	n=17 (60.7%)	n=76 (61.8%)
2. Enrolled nurses	n=11 (18.3%)	n=8 (22.9%)	n=2 (7.1%)	n=21 (17.1%)
3. Enrolled nurse assistants	n=1 (1.7%)	n=0 (0.0%)	n=0 (0.0%)	n=1 (0.8%)
4. Doctors	n=37 (61.7%)	n=25 (71.4%)	n=18 (64.3%)	n=80 (65.0%)
Total of all 4 variables per nurse category Total = N	**89**	**52**	**37**	**N=178**

- **Item C34: Signatures required when altering MARs**

For this question, the participants were asked to select whether alterations to MARs required a signature or not. The response rate to this question was 100% (N=123). n=108 (87.8%) chose the option that alterations to MARs indeed required a signature, while n=15 (12.2%) did not (Table 4.42). The n=15 (12.2%) that did not believe that a signature was required included n=2 RNs, n=6 ENs, and n=7 ENAs. The Pearson Chi-square test identified a statistical difference (p = 0.009) between the last training the participants received and whether they thought a signature was required for alterations to MARs.

Table 4.42 Signatures required when altering MARs

Signatures are required when altering MARs	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=58 (96.7%)	n=29 (82.9%)	n=21(75.0%)	n=108 (87.8%)
No	n=2 (3.3%)	n=6 (17.1%)	n=7 (25.0%)	n=15 (12.2%)
Total = N	**60**	**35**	**28**	**123 (100%)**

- **Item C35: Requiring witness signatures with amendments of MARs**

Concerning the previous question (Item C34) of whether a signature was required when making alterations to MARs, statistical analysis showed in Table 4.43 that n=76 (61.8%) of participants deemed it unnecessary to have a witness signature when making amendments to MARs. Using

the Spearman's rho for statistical analysis, it indicated a significant difference of p = <.001 between the last medication training that the participants received and whether they thought a witness signature was required for amendments to MARs. The response rate to this question was 100% (N=123).

Table 4.43 Witness signatures required when amending MARs

Signatures are required when altering MARs	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=27 (45.0%)	n=16 (45.7%)	n=4 (14.3%)	n=47 (38.2%)
No	n=33 (55.0%)	n=19 (54.3%)	n=24 (85.7%)	n=76 (61.8%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D63: Reasons for not recording missing entries on MARs**

The question posed as statement 9 to participants was that health auditors looked for missing entries on MAR sheets. Participants could select more than one option, to indicate what they perceived as reasons for not recording the missing entries in the MARs. The response rate to this question was 100% (N=123). From the results, as shown in Figure 4.12, it appeared that the lack of recording missing entries could not be attributed to resources, such as not enough space on the MARs. Only n=10 (16.7%) of the RNs and none of the ENs and ENAs selected this as a possible reason. The highest score revealed that n=99 (80.5%) believed the reason was that *"people forget",* especially ENAs when considering the group sizes, n=26 (92.9%). Time pressure was provided as a lessor reason by RNs, n=23 (38.3%), ENs, n=21 (38.2%), and ENAs n=11 (39.3%). Further statistical analysis using the Spearman's rho showed a significant correlation (p = .010) between the variables *"missing entries not recorded due to time pressure"* and a reason for medication errors where participants felt under pressure to complete a drug round in a certain amount of time (Item B15).

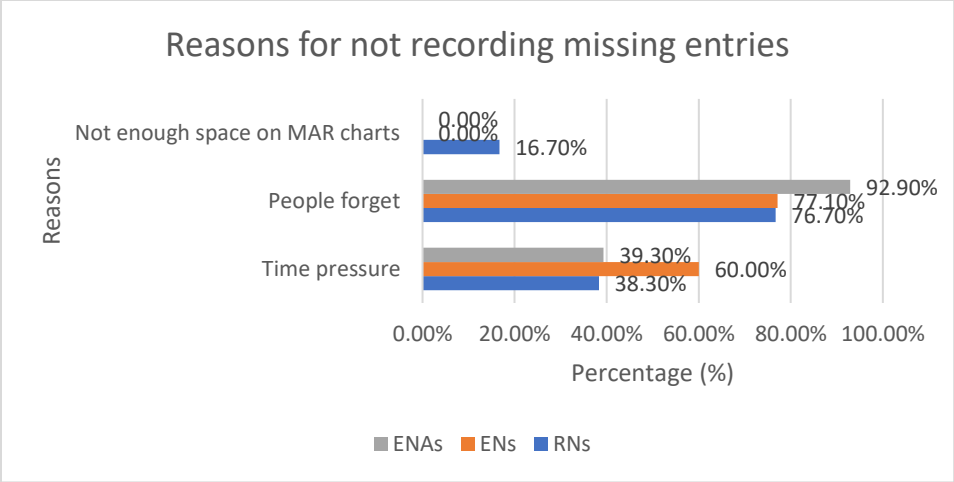

Figure 4.12 Reasons for not recording missing entries

- **Item D64: Reasons for not recording the reasons for non-administration**

Apart for reasons for not recording missing entries in MARs, this question elicited responses from participants on possible reasons for not recording when they did not administer medication. As in the previous responses, the statistical analysis (Figure 4.13) indicated the main reason by participants as n=95 (77.2%) *"people forget".* The ENAs, n=27 (96.4%), selected this as their main reason for not recording non-administration. Participants' lesser reason for not recording non-administration was resource-related, as only n=13 (10.6%) selected *"not enough space on the MAR charts"* as the reason. The RNs with n=28 (46.7%), and relative to the group size, was the nurse category rating *"time pressure"* as the second biggest reason for non-administration.

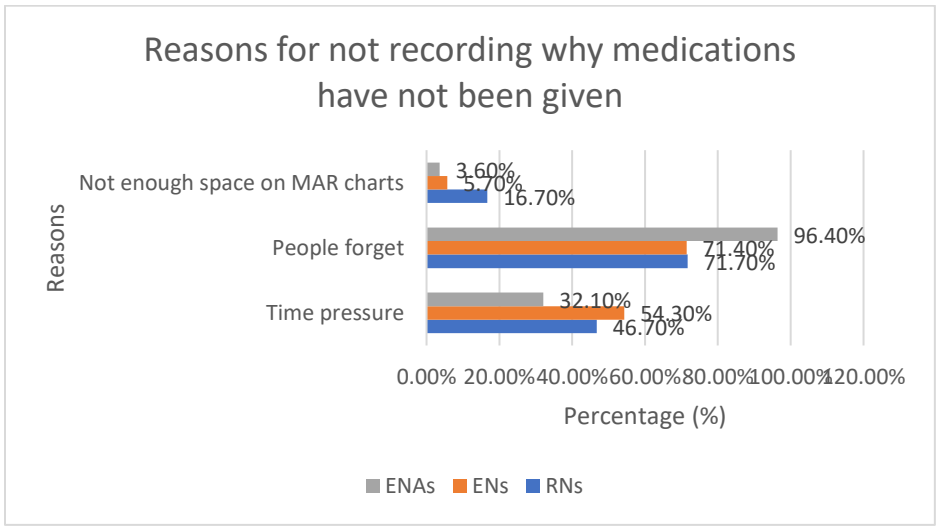

Figure 4.13 Reasons for not recording why medications have not been given

- **Item D65: Reasons for not recording the number/dosage of "pro re nata" (PRN) medications**

For this question, the respondents were asked to document their opinions on why the number/dose of "pro re nata" (PRN) medication was sometimes not recorded. Between the three choices of *"time pressure", "people forget",* or *"insufficient space on the MAR*", most participants, n=88 (72.1%), opted for *"people forget". "Time pressure"* was selected by n=40 (32.8%), while *"not enough space on the MAR"* as an option elicited only a response from n=12 (9.8%), as seen in Figure 4.14.

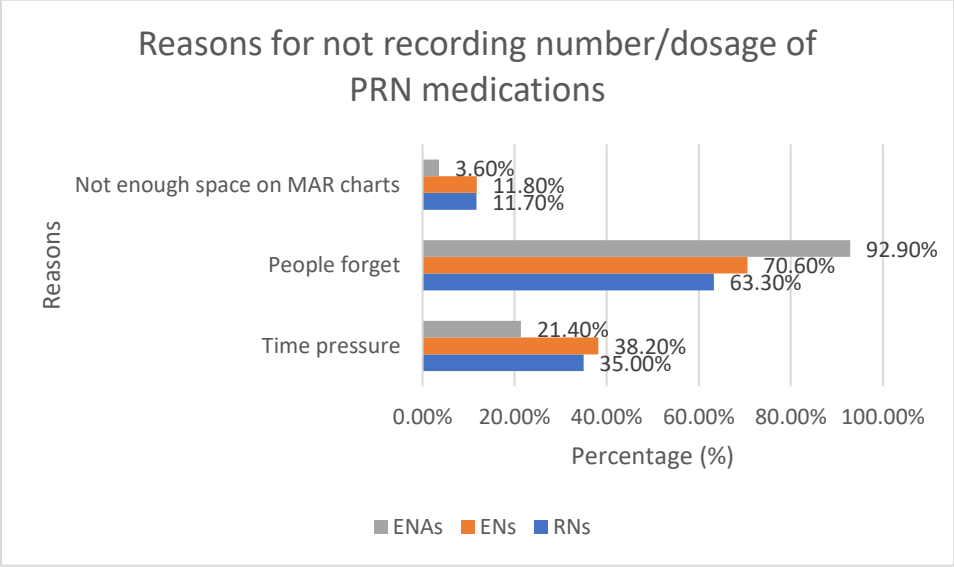

Figure 4.14 Reasons for not recording the number/dosage of "pro re nata" (PRN) medications

- **Item D68: Procedures followed for making new entries on MARs**

The response rate to this question was 100% (N=123). According to the scores in Table 4.44, n=85 (69.1%) of participants had come across occasions where the MAR charts were changed rather than new entries made when medication changes occurred. The nurse category noticing these changes made as opposed to making new entries the most was, relative to the group size, the ENAs, n=24 (85.7%). Since more than half of the RNs, n=41 (68.3%), also came across occasions where entries were changed rather than new entries made, it could raise the question whether this was acceptable practice and allowed in the facilities to make changes rather than new entries.

Table 4.44 Participants have seen entries changed rather than making new entries on MARs

Participants have seen entries changed rather than new entries made	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=41 (68.3%)	n=20 (57.1%)	n=24 (85.7%)	n=85 (69.1%)
No	n=19 (31.7%)	n=15 (42.9%)	n=4 (14.3%)	n=38 (30.9%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D69: Signing of medication changes on MAR chart**

All the participants answered this question, N=123 (100%). When applying the Mann-Whitney U-test it indicated a statistically significant difference (p = <.001) between participants who indicated that they did come across occasions where new entries due to medication changes were not signed by two people, and whether a witness signature was indeed required when amendments were made to MARs. A total of n=100 (81.3%) participants had seen medications not signed by two people (Table 4.45), but then only n=47 (38.2%) participants indicated that a witness signature was required in their facilities (Item C35).

Table 4.45 Signing of medication changes by two people

Participants saw medication changes not signed by two people	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=50 (83.3%)	n=24 (68.6%)	n=26 (92.9%)	n=100 (81.3%)
No	n=10 (16.7%)	n=11 (31.4%)	n=2 (7.1%)	n=23 (18.7%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D70: Illegible handwriting**

The majority of participants n=103 (83.7%), as indicated in Table 4.46, agreed that they found it difficult to decipher other people's handwriting, about new entries made for medication changes and signed on the MARs. Relative to the size of the group, most of the ENAs, as n=27 (96.4%), appeared to find handwriting difficult to decipher on the MARs. The response rate to this question was 100% (N=123).

Table 4.46 Finding handwriting illegible

Participants find handwriting illegible	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=48 (80.0%)	n=28 (80.0%)	n=27 (96.4%)	n=103 (83.7%)
No	n=12 (20.0%)	n=7 (20.0%)	n=1 (3.6%)	n=20 (16.3%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item D73: When participants sign MAR charts**

The signing of MAR charts was assessed according to whether participants signed before potting (signed before preparing medicines in pill dose containers in advance for later administration), signed after potting (signed after preparing medicines in pill dose containers in advance for later administration), signed when given to residents from blister/medication containers, and signed when given to residents from daily or weekly pill dose containers. Participants could select multiple options. Most of the participants n=102 (82.9%) indicated that they signed the MAR sheets after giving medicines from the blister or container, as displayed in Table 4.47. Also, slightly more than half of the participants n=63 (51.2%) signed the MAR sheets after administering medicines from daily or weekly pill dose containers. A Pearson correlation test was computed to assess the relationship between where residents' medications were dispensed from and signing the MARs after administering from pill dose containers. There was a positive correlation between the two variables, p = .013, suggesting that when the medication was prepared in advance in nurses' offices and carried to residents, participants were more likely to sign the MAR sheet after administering it from a pill dose container.

Table 4.47 When participants sign MAR charts

When participants sign MAR sheets (1-4)	RNs, including senior RNs N=60 Frequency (f)	ENs N=35 Frequency (f)	ENAs N=28 Frequency (f)	Total of all 3 nurse categories per variable N=123 (100%)
1. Sign before potting	n=2 (3.3%)	n=2 (5.7%)	n=1 (3.6%)	n=5 (4.1%)
2. Sign after potting	n=5 (8.3%)	n=3 (8.6%)	n=1 (3.6%)	n=9 (7.3%)
3. Sign when given from blister/container	n=53 (88.3%)	n=30 (85.7%)	n=19 (67.9%)	n=102 (82.9%)
4. Sign when given from pill dose container	n=23 (38.3%)	n=15 (42.9%)	n=25 (89.3%)	n=63 (51.2%)
Total of all 4 variables per nurse category Total =N	**83**	**50**	**46**	**N=179**

- **Item D74: Observed mass signing of MAR charts**

The mass signing of MAR charts (all charts signed together at the same time) was seen or suspected by n=69 (56.1%) of all the participants, N=123 (100%), who responded to this question (see Table 4.48). The ENs (as relative to the size of the group) saw the mass signing of MAR charts the least, with n=19 (54.3%). A Pearson Chi-Square test of independence was computed to determine if there was an association between participants indicating that they signed the MAR chart when they gave medication to residents from the blisters/containers (Item D73) and whether they had observed the mass signing of MAR charts. The data suggested that there was no significant association, as the Pearson Chi-square was 2.417 and p = .120.

Table 4.48 Observed mass signing of MAR charts

Suspect mass MAR signing	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=33 (55.0%)	n=16 (45.7%)	n=20 (71.4%)	n=69 (56.1%)
No	n=27 (45.0%)	n=19 (54.3%)	n=8 (28.6%)	n=54 (43.9%)
Total =N	**60**	**35**	**28**	**123 (100%)**

4.4.3 Section B3: Use of technology

According to available literature discussed in Chapter Two (2), technology and tools such as mobile devices and computers can be valuable in medication management. Various specific software applications are used to assure the quality and safety of residents and can assist with the prevention of medication errors. Section E and F of the data collection instrument elicited answers from participants regarding the use of computers at home and work, and the use of mobile phones, respectively.

4.4.3.1 Variable 12: Computers at home

In this section, participants were asked to indicate whether they use computers at home, the frequency of the use, as well as the tasks performed on their home computers.

- **Item E78: Frequency of use of a computer at home**

From the study population of N=123 (100%), n=46 (37.4%) never used computers at home, whereas n=45 (36.6%) indicated daily usage, n=26 (21.1%) used computers weekly, and n=6 (4.9%) indicated only monthly usage. Table 4.49 showed that the highest non-users were the ENAs which were n=20 (71.4%) of the ENA study population, and the highest daily users were the RNs, n=31 (51.7%), which were slightly higher than half of the total RNs.

Table 4.49 Frequency of use of a computer at home

Frequency of use of a computer at home	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Never	n=11 (18.3%)	n=15 (42.9%)	n=20 (71.4%)	n=46 (37.4%)
Daily	n=31 (51.7%)	n=11 (31.4%)	n=3 (10.7%)	n=45 (36.6%)
Weekly	n=15 (25.0%)	n=8 (22.9%)	n=3 (10.7%)	n=26 (21.1%)
Monthly	n=3 (5.0%)	n=1 (2.9%)	n=2 (7.1%)	n=6 (4.9%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item E79: Tasks performed on a computer at home**

From the previous question (Item E78), n=77 (62.6%) of participants used a computer at their house and therefore answered this question to indicate which tasks they used a computer for. Participants could select any of the options that applied to them. The results in Figure 4.15 showed that the highest score for all three nurse categories was for emails, n=67 (54.5%), and the second-largest score indicated that the three nurse categories used a computer at home for information gathering, n=55 (44.7%). Both the RNs n=47 (78.3%) and ENs n=15 (42.9%) scored email use

the highest, whilst the ENAs used a computer at home equally for emails and playing games, n=5 (17.9%). Across all three nurse categories, computers were used the least for chat or discussion groups, n=12 (9.8%).

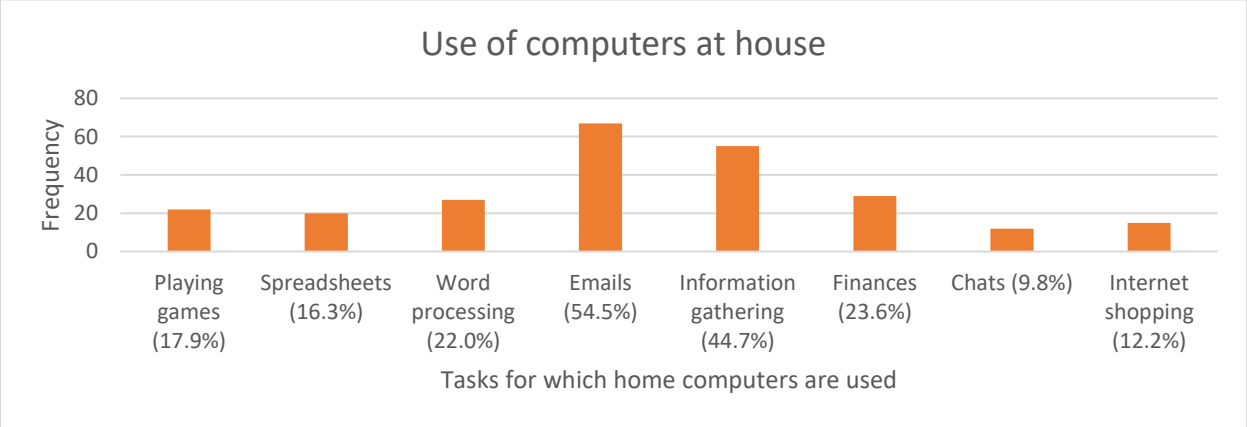

Figure 4.15 Tasks performed on a computer at home

4.4.3.2 Variable 13: Computers at the workplace

This section addressed whether participants used computers at work, the frequency thereof and the tasks performed on a work computer. Also, participants were asked to rate their experience in the use of computers.

- **Item E80: Frequency of use of a computer at work**

Analysis of the frequency of computer use at work showed that there was an equal number of participants that never used a computer at work n=58 (47.2%) as participants that used a computer daily at work n=58 (47.2%). The ENAs seldom used a computer at work, as seen in Table 4.50, where only n=3 (10.7%) used a computer daily or weekly. The more regular users were the RNs, with n=45 (75.0%), who used computers daily. The response rate to this question was 100% (N=123).

Table 4.50 Frequency of use of a computer at work

Frequency of computer use at work	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Never	n=12 (20.0%)	n=21 (60.0%)	n=25 (89.3%)	n=58 (47.2%)
Daily	n=45 (75.0%)	n=12 (34.3%)	n=1 (3.6%)	n=58 (47.2%)
Weekly	n=3 (5.0%)	n=1 (2.9%)	n=2 (7.1%)	n=6 (4.9%)
Monthly	n=0 (0.0%)	n=1 (2.9%)	n=0 (0.0%)	n=1 (0.8%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item E81: Tasks performed on a computer at work**

From the previous question (Item E80), n=65 (52.8%) of participants used a computer at their work. For this question, participants who indeed used a computer at their workplace could select any of the provided tasks that applied to them. The results in Table 4.51 showed that managing residents' data and records, as well as work email, were tasks equally frequent performed by participants n=53 (43.1%) on a work computer. Following these tasks, was using a work computer for information gathering, n=40 (32.5%). Work computers were used minimally by ENAs, with email being the task most performed, n=3 (10.7%). Analysis of the results showed that RNs were the nurse category using a work computer the most for work-related tasks, such as email, n=42 (70.0%), patient data and records, n=38 (63.3%), and for information gathering, n=34 (56.7%). The Pearson Chi-square test of independence indicated a significant association between the use of work computers for email and formal computer training, with a $p = .018$.

Table 4.51 Tasks performed on a computer at work

Uses of computers at work (1-7)	RNs, including senior RNs N=60 Frequency (f)	ENs N=35 Frequency (f)	ENAs N=28 Frequency (f)	Total of all 3 nurse categories per variable N=123 (100%)
1. Patient data/ records	n=38 (63.3%)	n=13 (37.1%)	n=2 (7.1%)	n=53 (43.1%)
2. Work emails	n=42 (70.0%)	n=8 (22.9%)	n=3 (10.7%)	n=53 (43.1%)
3. Ordering/stock control	n=30 (50.0%)	n=8 (22.9%)	n=1 (3.6%)	n=39 (31.7%)
4. Word processing	n=25 (41.7%)	n=5 (14.3%)	n=2 (7.1%)	n=32 (26.0%)
5. Management e.g., off duties	n=28 (46.7%)	n=5 (14.3%)	n=0 (0.0%)	n=33 (26.8%)
6. Internet for information gathering	n=34 (56.7%)	n=5 (14.3%)	n=1 (3.6%)	n=40 (32.5%)
7. Internet for work chat/ discussion groups	n=12 (20.0%)	n=5 (14.3%)	n=1 (3.6%)	n=18 (14.6%)
Total of 7 variables per nurse category Total =N	**209**	**49**	**10**	**N=268**

- **Item E83: Experience in computer use**

The response rate to this question was 100% (N=123). Concerning participants' experience in computer use, as seen in Table 4.52, slightly more than half of the RNs rated themselves as

"average", n=32 (53.3%). Of the RNs, only n=13 (21.7%) rated themselves as between fairly and very experienced. Most ENAs rated themselves as "fairly inexperienced", n=12 (34.3%). Of the ENs, only n=6 (17.1%) rated themselves as between fairly and very experienced. With most ENAs, n=20 (71.4%), rating themselves as "very inexperienced", only n=2 (7.1%) rated themselves as between fairly and very experienced. Further statistical analysis using the Pearson Correlation test showed with a p-value of p = <.001 that there was a significant correlation between participants' formal training in computer use and participants' experience in computer use.

Table 4.52 Experience in computer use

Computer experience	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Very inexperienced	n=8 (13.3%)	n=8 (22.9%)	n=20 (71.4%)	n=36 (29.3%)
Fairly inexperienced	n=7 (11.7%)	n=12 (34.3%)	n=3 (10.7%)	n=22 (17.9%)
Average	n=32 (53.3%)	n=9 (25.7%)	n=3 (10.7%)	n=44 (35.8%)
Fairly experienced	n=10 (16.7%)	n=4 (11.4%)	n=2 (7.1%)	n=16 (13.0%)
Very experienced	n=3 (5.0%)	n=2 (5.7%)	n=0 (0.0%)	n=5 (4.1%)
Total =N	**60**	**35**	**28**	**123 (100%)**

4.4.3.3 Variable 14: Mobile phones

This section focused on participants' use of personal mobile phones for work purposes, and the specific tasks they performed with their mobile phones at work.

- **Item F84: Participants may use their mobile phones for work purposes**

All the study participants answered this question, N=123 (100%). The results in Table 4.53 indicated that n=86 (69.9%) participants could use their mobile phones for work purposes, while n=37 (30.1%) was not allowed. RNs as a nurse category was more allowed to use their mobile phones for work purposes, n=50 (83.3%), than the other nurse categories, such as the ENAs of whom only half, n=14 (50.0%), could use their mobile phones for work purposes.

Table 4.53 Participants may use their mobile phones for work purposes

Participants may use their phones for work purposes	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Yes	n=50 (83.3%)	n=22 (62.9%)	n=14 (50.0%)	n=86 (69.9%)
No	n=10 (16.7%)	n=13 (37.1%)	n=14 (50.0%)	n=37 (30.1%)
Total =N	**60**	**35**	**28**	**123 (100%)**

- **Item F85: Tasks for which mobile phones are used at work**

From the previous question (Item E84), n=86 (69.9%) of participants could use their mobile phone for work purposes. For this question, participants could select any of the provided tasks performed with a mobile phone that applied to them. The results in Table 4.54 showed that participants used their mobile phones mostly for texting, n=79 (64.2%), and instant messaging, n=61 (49.6%). The score for *"making work-related calls"* for RNs, n=41 (68.3%) was more than double that of the ENs, where the ENAs scored only n=2 (3.7%). All N=123 (100%) answered this question,

Table 4.54 Tasks for which personal mobile phones are used at work

Task mobile phones are used for at work (1-9)	RNs, including senior RNs N=60 Frequency (f)	ENs N=35 Frequency (f)	ENAs N=28 Frequency (f)	Total of all 3 nurse categories per variable N=123 (100%)
1. Make work related calls	n=41 (68.3%)	n=11 (31.4%)	n=2 (3.7%)	n=54 (43.9%)
2. Text work related people	n=45 (75.0%)	n=20 (57.1%)	n=14 (50.0%)	n=79 (64.2%)
3. Take work related photographs	n=28 (46.7%)	n=6 (17.1%)	n=1 (3.6%)	n=35 (28.5%)
4. Check work related emails	n=10 (16.7%)	n=2 (5.7%)	n=1 (3.6%)	n=13 (10.6%)
5. Surf the internet for work-related information	n=12 (20.0%)	n=5 (14.3%)	n=1 (3.6%)	n=18 (14.6%)
6. Create work related documents	n=2 (3.3%)	n=2 (5.7%)	n=1 (3.6%)	n=5 (4.1%)
7. Instant messaging	n=35 (58.3%)	n=14 (40.0%)	n=12 (42.9%)	n=61 (49.6%)
8. Use as calculator	n=24 (40.0%)	n=10 (28.6%)	n=0 (0.0%)	n=34 (27.6%)
9. Set reminders	n=12 (20.0%)	n=9 (25.7%)	n=1 (3.6%)	n=22 (17.9%)
Total of all 5 variables per nurse category Total =N	**209**	**79**	**33**	**N=321**

4.5 COMPONENT NO 3: OUTCOME MEASURES

According to the Structure-Process-Outcome Quality of Care Model of Donabedian used as a conceptual framework for this study, the preceding structure and process measures affected outcome measures, the last component of the Quality of Care Model (Donabedian, 2005:691–729). Section C contains the results of participants' responses to questions related to medication errors that had an impact on residents' health status and the residential facilities for older persons in the Metro-North, WCP.

4.5.1 Section C1: Changes to residents' health status

Medication errors that can have an impact on the health of residents, such as harm and death, are an indicator of the extent to which there is adherence to safe medication administration practices. This section contained participants' responses to questions to assist with meeting research objective *RO.4*, which was to provide evidence of factors associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, WCP, as provided by nurses.

4.5.1.1 Variable 15: Errors encountered

The following responses to the questions below contained the type of medication errors observed by participants in their facilities that could have an impact on the health of residents.

- **Item B16: Medication errors seen by participants in their facilities**

Participants could select more than one of the provided options that applied, to illustrate the medication errors that they had seen in their facilities (Table 4.55). It was disconcerting to see that participants had seen multiple medication errors, of which the lowest score was for wrong medication given, n=16 (13.1%). Missing medication altogether was the medication error most seen by n=79 (64.8%) participants. With further statistical analyses, there appeared to be no statistically significant correlation between missing medication altogether and interim medication supplies midmonth and placed in incorrect racks (Item D48) when calculating the Pearson Chi-square test, with a p-value of p = .968. Also, when exploring the possible relationship between missing medication altogether and when residents missed medication due to their absenteeism during a round when it was their turn (Item D61), the Pearson Chi-square test, with a p-value of p = .240 indicated there was no statistically significant relationship. Following missing medication

altogether as the medication error most seen was medication given at the wrong time by n=62 (50.8%).

Table 4.55 Medication errors seen by participants in their facilities

Medication errors seen (1-6)	RNs, including senior RNs N=60 Frequency (f)	ENs N=35 Frequency (f)	ENAs N=28 Frequency (f)	Total of all 3 nurse categories per variable N=123 (100%)
1. Medication missed altogether	n=35 (59.3%)	n=23 (65.7%)	n=21 (75.0%)	n=79 (64.8%)
2. Medication given at the wrong time	n=24 (40.7%)	n=19 (54.3%)	n=19 (67.9%)	n=62 (50.8%)
3. Administering medications that have been discontinued	n=13 (22.0%)	n=10 (28.6%)	n=11 (39.3%)	n=34 (27.9%)
4. Wrong dosage being given	n=11 (18.6%)	n=10 (28.6%)	n=1 (3.6%)	n=22 (18.0%)
5. Medication given to the wrong resident	n=8 (13.6%)	n=6 (17.1%)	n=5 (17.9%)	n=19 (15.6%)
6. Wrong medication given	n=4 (6.8%)	n=9 (25.7%)	n=3 (10.7%)	n=16 (13.1%)
Total of all 6 variables per nurse category Total =N	**95**	**77**	**60**	**N=232**

4.5.2 Section C2: Implications of medication errors for facilities

Since residents could expect adherence to practice standards on medication administration, non-adherence could not only lead to harm and death, but negligence claims, vicarious liability, and litigation costs. Hence, the emphasis on the “five rights” of medication administration: the right dose, route, time, drug, and the right resident. Responses of participants to questions included among other things potential avoidable medication errors.

4.5.2.1 Variable 16: Confidence in the safety of medication administration systems

Participants were asked how confident they were that their current drug administration system: (a) ensures that their residents received their medication on time; (b) was time-efficient concerning the duration of medication rounds; and (c) was the best given the number of staff available to dispense medicines.

- **Items B23-B25: Confidence in the safety of current medication administration systems**

The response rate to this question was also 100% (N=123). It was pleasing to see that none of the participants selected that they had no confidence in their medication administration systems. As shown in Table 4.56, n=62 (50.4%) participants indicated that they were very confident, and n=58 (47.2%) fairly confident that their current medication administration systems were safe, and that their residents received their medication ***on time.*** Only n=3 (2.4%) lacked the confidence to a degree in their current medication administration systems, concerning their residents receiving their medication on time. When inquiring about participants' confidence in their current medication administration systems' time efficiency concerning the ***duration of medication rounds***, as illustrated in Table 4.57, n=64 (52%) was very confident, and n=55 (44.7%) fairly confident. Again, only n=4 (3.3%) fairly lacked confidence in their systems. Concerning whether current medication administration systems were the best given the ***number of staff*** available to administer medication, in Table 4.58, n=53 (43.1%) participants again showed that they were very confident, with n=63 (51.2%) being fairly confident, and n=7 (5.7%) fairly lacked confidence. Further statistical analysis using the Pearson Correlation test indicated a statistically significant difference (p = .002), where participants with years of work experience of more than three years in residential facilities for older persons were more likely to believe that their current medication administration systems were safe given the number of staff available to administer medication.

Table 4.56 Confidence of participants that their medication administration systems allow residents to receive medication timeously

Participants confidence in the safety of their medication system regarding medication is given on time	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Very confident	n=39 (65.0%)	n=21 (60.0%)	n=2 (7.1%)	n=62 (50.4%)
Fairly confident	n=21 (35.0%)	n=13 (37.1%)	n=24 (85.7%)	n=58 (47.2%)
Fairly lacking in confidence	n=0 (0.0%)	n=1 (2.9%)	n=2 (7.1%)	n=3 (2.4%)
No confidence	n=0 (0.0%)	n= 0 (0.0%)	n= 0 (0.0%)	n= (0.0%)
Total = N	**60**	**35**	**28**	**123 (100%)**

Table 4.57 Confidence of participants that their medication administration systems are time efficient with regard to the duration of medication rounds

Participants confidence in the safety of their medication system regarding the length of the rounds	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Very confident	n=40 (66.7%)	n=22 (62.9%)	n=2 (7.1%)	n=64 (52.0%)
Fairly confident	n=19 (31.7%)	n=12 (34.3%)	n=24 (85.7%)	n=55 (44.7%)
Fairly lacking in confidence	n=1 (1.7%)	n=1 (2.9%)	n=2 (7.1%)	n=4 (3.3%)
No confidence	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)
Total = N	**60**	**35**	**28**	**123 (100%)**

Table 4.58 Confidence of participants that their medication administration systems are safe considering the number of staff available

Participants confidence in the safety of their medication system regarding the number of staff available	RNs, including senior RNs Frequency (f)	ENs Frequency (f)	ENAs Frequency (f)	Total N= (%)
Very confident	n=33 (55.0%)	n=19 (54.3%)	n=1 (3.6%)	n=53 (43.1%)
Fairly confident	n=25 (41.7%)	n=15 (42.9%)	n=23 (82.1%)	n=63 (51.2%)
Fairly lacking in confidence	n=2 (3.3%)	n=1 (2.9%)	n=4 (14.3%)	n=7 (5.7%)
No confidence	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)	n=0 (0.0%)
Total = N	**60**	**35**	**28**	**123 (100%)**

4.5.2.2 Variable 17: Medication accountability

Nurses are accountable for their actions towards residents, employers, and the regulating body for nurses, the SANC. The following section elicited answers from participants regarding their perceptions of the most common errors of medication accountability.

- **Item B17: Most common errors of medication accountability**

Participants could select more than one option as a response to the question of which they think were the most common errors of medication accountability. More than half of the participants, n=70 (56.9%), selected the most common error of medication accountability as not signing for medications that they indeed administered (Table 4.59). For the ENs, n=22 (62.9%), this

appeared to be their main concern. When statistically analysing the correlation of this variable and participants' perceptions of the reasons for not signing medications, the Pearson's Chi-square test indicated that there was no statistically significant correlation between the variables measure in Item D63, "*time pressure"* (*p* = .634), "*people forget"* (*p* = .446) and "*not enough space on MAR charts"* (*p* = .260). The second most common error was closely linked, with n=69 (56.1%) indicating that not providing a reason when the medication was not administered as an error of medication accountability. This error appeared to be the biggest concern for both RNs, n=33 (55.0%) and ENAs, n=19 (67.9%).

Table 4.59 Most common errors of medication accountability

Common medication accountability errors (1-6)	**RNs, including senior RNs N=60 Frequency (f)**	**ENs N=35 Frequency (f)**	**ENAs N=28 Frequency (f)**	**Total of all 3 nurse categories per variable N=123 (100%)**
1. Not signing for medication administered	n=30 (50.0%)	n=22 (62.9%)	n=18 (64.3%)	n=70 (56.9%)
2. Not recording reasons for non-administration	n=33 (55.0%)	n=17 (48.6%)	n=19 (67.9%)	n=69 (56.1%)
3. Not recording actual amounts	n=8 (13.3%)	n=13 (37.1%)	n=13 (46.4%)	n=34 (27.6%)
4. Not recording times for "pro re nata" (PRN) medications	n=26 (43.3%)	n=16 (45.7%)	n=16 (57.1%)	n=58 (47.2%)
5. Not booking in stock received	n=7 (11.7%)	n=5 (14.3%)	n=2 (7.1%)	n=14 (11.4%)
6. No witness available to sign MAR changes	n=21 (35.0%)	n=14 (40.0%)	n=8 (28.6%)	n=43 (35.0%)
Total of all 6 variables per nurse category Total =N	**125**	**87**	**76**	**N=288**

4.5.2.3 Variable 18: Resource-related medication errors

Some medication errors that can have implications for facilities are resource related. Participants were asked for their perceptions regarding the most common resource-related errors they experienced in their facilities.

- **Item B15: Most common resource-related reasons for medication errors**

Figure 4.16 showed the most common resource-related reasons for medication errors according to the perceptions of participants, from the most to least common. All three categories of nurses, namely RNs n=42 (70.0%), ENs n=26 (74.3%), and ENAs n=25 (89.3%), scored frequent interruptions during the medication round as the most common reason for medication errors. n=22 (36.7%) of RNs scored poor/insufficient knowledge of action and side effects of medications as the second most common reason for medication errors, in contrast with n=17 (48.6%) ENs who scored *"staff are under stress"* the second most common reason and the n=12 (42.9%) ENAs who scored *"under pressure to complete drug round in a certain amount of time"* the second most common reason.

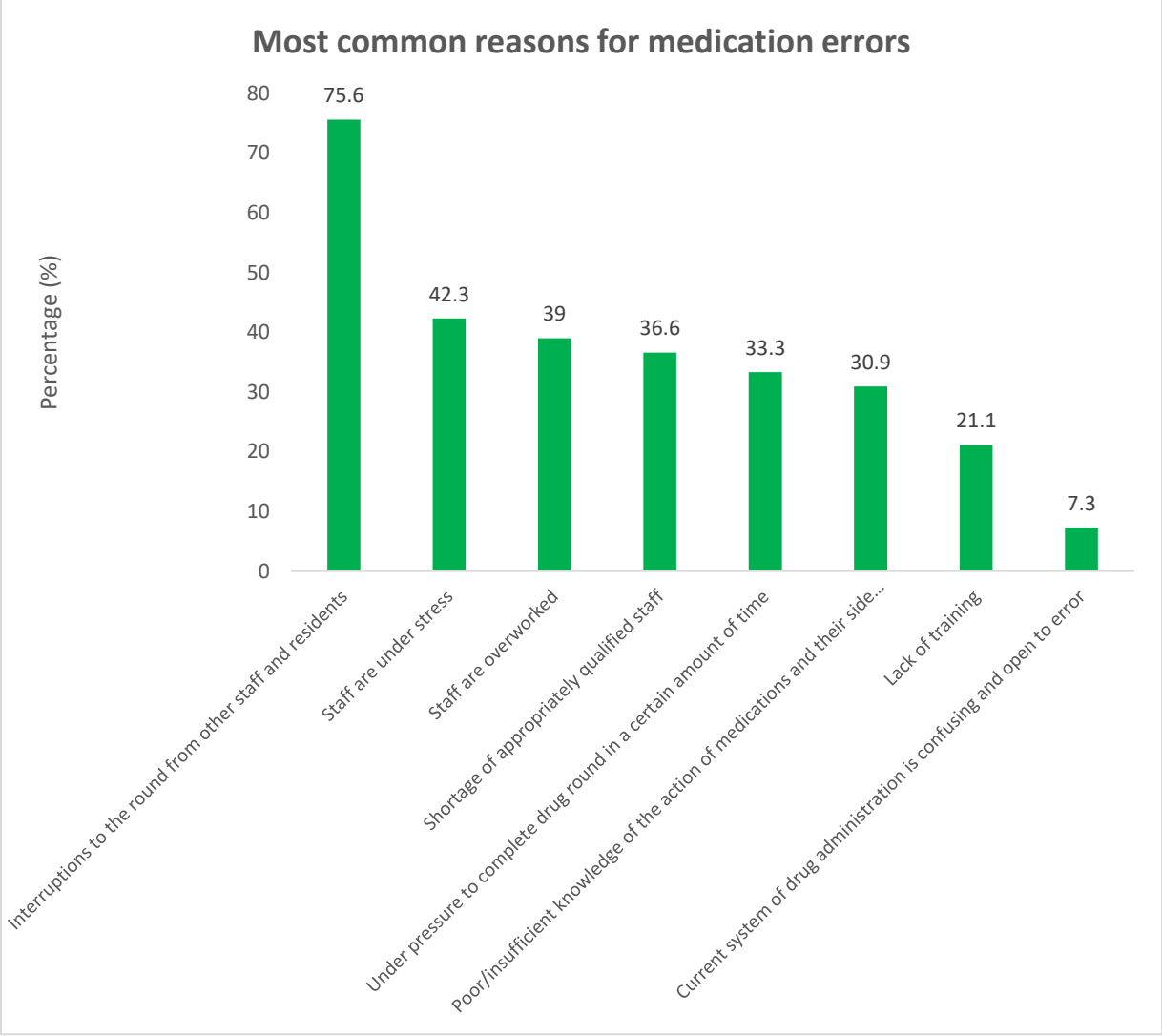

Figure 4.16 Most common resource-related reasons for medication errors

4.6 SUMMARY

The aim of this chapter, Chapter Four (4), was to investigate the objectives set within this study to answer the research question provided in Chapter One (1), Section 1.4. The data collected from study participants was analysed with the use of statistical tests. Tables and graphs were inserted to facilitate the interpretation of this data. A detailed discussion of the findings of the study as it relates to the research study's aim and objectives as set out in Chapter One (1), Sections 1.5 and 1.6, follows in Chapter Five (5). This will include the conclusions made, recommendations based on the results and findings of the study, as well as the limitations concerning this study.

CHAPTER 5
DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter (Chapter 4) provided a detailed overview of the data collected from study participants and the analysis thereof with the aid of statistical tests. Building on this analysis was a discussion of the study findings as they relate to the study's aim and research objectives (Chapter 1, Sections 1.5 and 1.6). Also, the limitations of this study will be discussed as it pertains to this study, with practical recommendations. These recommendations are based on the results and findings of the study. Following the recommendations are proposed suggestions for further investigation and future research.

5.2 DISCUSSION

This study aimed to determine the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, WCP. Based on this aim (Chapter 1, Section 1.5), specific objectives were formulated to guide this research study (Chapter 1, Section 1.6). The discussion of the study findings in this chapter was aligned with literature based on previous research, as discussed in Chapter Two (2). Also, study findings will be aligned with the conceptual framework, Donabedian's Structure-Process-Outcome Quality of Care Model, which was used to guide the research process (Donabedian, 2005:691–729). The following objectives will be discussed separately:

- RO.1. Determine the socio-biographical data related to nurses working in the specified residential facilities for older persons within the Metro-North, Western Cape Province.
- RO.2. Investigate the type of organisational resources and infrastructures in specified residential facilities for older persons within the Metro-North, Western Cape Province.
- RO.3. Identify the medication administration process followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, Western Cape Province.

- RO.4. Provide evidence of factors associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, Western Cape Province, as provided by the nurses.

5.2.1 Objective RO.1: Determine the socio-biographical data related to nurses working in the specified residential facilities for older persons within the Metro-North, Western Cape Province.

To meet the first objective, which is the first component according to Donabedian (Component ***No 1: Structural measures***, Table 4.1), the discussion will include nurses as resources within the medication administration process and organisational infrastructures as well as organisational resources (ACT Academy, 2018; Al-Jumaili & Doucette, 2017:470–488; Donabedian, 2005:691–729).

5.2.1.1 Section A1: Nurses as resources in the medication administration process

According to Donabedian's conceptual framework, nurses are a structure or input measure. These characteristics of a structure or input measures will impact service delivery (ACT Academy, 2018; Donabedian, 2005:691–729). Therefore, nurses' characteristics such as their biographical data (age and gender), and professional biographical data (employment status, nursing category, years of experience, and qualifications) have an impact on processes and outcomes, in this instance: safe medication administration to the elderly in residential facilities for older persons (ACT Academy, 2018; Donabedian, 2005:691–729). The discussion of nurses' characteristics included their biographical data, the medication and computer training they received, as well as the highest sources of job pressures in the workplace as perceived by the study participants.

5.2.1.1.1 Variable 1: Biographical data

The global trend suggests that the bulk of the nursing workforce is employed at hospitals with only a small group of nurses working in residential facilities or nursing homes (Drennan & Ross, 2019:25–37). In this study, the study participants of N=123 (100%) consisted of N=60 (48.7%) RNs, N=35 (28.5%) ENs and N=28 (22.8%) ENAs. For clarity (as reported in Chapter 4, Item A3), ENAs were included in this study as this nurse category was also allowed to administer medications to the elderly in the residential facilities for older persons in the WCP, as seen by the researcher during her work as a health auditor. This is even though the scope of practice of the

ENAs in South Africa does not include medication administration (SANC, 1984). Notwithstanding this regulation, apparent shortages of RNs and ENs compel employers to appoint more ENAs although also contradictory to the prescribed staffing model in the Regulations Regarding Older Persons under the Older Persons Act 13 of 2006 (RSA, 2010:64).

The study participants selected for this study were a more mature group with an average age of 51.31 years. This correlates with the average age of a first-world country such as the United States, indicating the average age of their nursing workforce as 51 years (Drennan & Ross, 2019:25–37; Smiley *et al.*, 2019:14). Unfortunately, the residential facilities in this study appear to attract a very small percentage of younger nurses, with only n=5 (4.4%) under 30 years and another n=13 (11.4%) under 40 years of age, as seen in Chapter Four (4), Figure 4.1. From the results, it can be deduced that younger nursing staff may possibly not be interested in working in residential care for elderly persons.

According to literature, the shortage of nurses is intensified due to an ageing workforce. Although these nurses may be productive, older nurses are more compromised due to the mental and physical demands of nursing (Uthaman, Chua & Ang, 2016:50–55). In the RN nurse category, only n=4 (7.0%) was under the age of forty years. When comparing the ages of study participants in each nurse category to the ages in each nurse category in South Africa, study participants in the EN nurse category of n=1 (3.2%) between 60 and 69 years and n=0 (0.0%) over 69 years were slightly lower than the statistics for South Africa of 7% between 60 and 69 years and 1% over 69 years (SANC, 2019). The study participants in the ENA nurse category of n=2 (7.7%) between 60 and 69 years and none (0%) over 69 years appears to mirror the trend in South Africa, of 7% between 60 and 69 years and 0% over 69 (SANC, 2019). In contrast, the study participants in the RN nurse category of n=18 (31.6%) between 60 and 69 years and n=4 (7.0%) over 69 years appears to be considerably higher than the 7% between 60 and 69 years and 1% over 69 years (SANC, 2019). These statistics point towards an ageing workforce, and other authors also identified the trend of utilising experienced and qualified nurses post-retirement to fill the gap in the nursing shortages in both South Africa and Thailand (Kaewpan & Peltzer, 2019:217; Spiva, Hart & McVay, 2011:1–10; Uthaman *et al.*, 2016:50–55). According to the Centres for Disease Control and Prevention (2021), older persons have a higher risk for developing severe illness due to COVID-19. It can thus be deduced that older nurses can also be a higher risk for developing severe illness due to COVID-19.

No men were participating in the study, which was not per the expected norm of a minority group of 9.1% male nurses working in South Africa and 10% worldwide, as described in 2.3.2 (Smiley *et al.,* 2019:14; SANC, 2019). When exploring the employment status of the study participants, all N=123 (100%) indicated their employer as the facility, with most participants working full-time n=112 (91.1%), and n=11 (8.9%) working part-time. The high number of part-time shifts (two to four shifts per week) could be due to the current COVID-19 pandemic. To clarify: the researcher observed during her work that staff who were in contact with residents who tested positive for COVID-19 had to self-isolate at home for 10 to 14 days. This resulted in a higher absenteeism rate than normal among the permanent staff and additional staff were utilised in the facilities in the form of part-time shifts, mostly on three months to six months limited duration contracts (Department of Co-operative Governance and Traditional Affairs, 2020a).

Study participants were experienced in residential care for older persons, with a combined score of n=76 (61.7%) having more than four years of experience of which n=34 (27.6%) had more than nine years of work experience. As a nurse category, the ENAs were the most experienced, with n=13 (46.4%) having more than nine years of experience. The researcher, therefore, concluded that it was an experienced healthcare group. This appeared consistent with an audit report on the quality of services in residential facilities for older persons in South Africa stating that limited financial resources led to heavy supplementing of inadequate nursing staff totals with auxiliary staff and care workers (Umhlaba Development Services, 2010:33,34,82).

Furthermore, the analyses of the data about the level of nursing education showed that of the 60 RNs who participated in this study, n=53 (88.33%) had a diploma level education, versus n=7 (11.7%) with a degree. Although there are vast differences in the qualifications required by nurses for practising globally, both diploma and degree-level qualifications are available to nurses in South Africa, which is similar to the opportunities provided by Austria, Germany, and Poland (SANC, 2019; WHO, 2017:424–426). In the light of these opportunities for RNs to obtain either a diploma or degree, the low percentage of RNs with a baccalaureate degree or higher was a concern, with the ageing population and challenges brought by an increase in acuity levels of residents. The challenge with polypharmacy alone was described by various authors (Al-Jumaili & Doucette, 2017:470–488; Dagli & Sharma, 2014:1–2; Metsälä & Vaherkoski, 2014:12–28). Although data was mainly available for hospitals, results indicated that there was an association between enough RNs with a bachelors level degree and less adverse events and deaths (Andersson, Frank, Willman *et al*., 2018:354–362). Also, professional development appeared limited as only n=8 (6.5%) of the N=123 (100%) study participants were busy undertaking further

nursing studies. According to SANC (2016), certain nursing courses in South Africa are being phased out in an attempt to align academic programs to the Higher Education Qualifications Sub-Framework. Therefore, ENs are now unable to enrol in a previously available bridging course for ENs that led to registration as a general nurse or a psychiatric nurse (SANC, 2016). However, both ENAs and ENs holding higher certificate qualifications can enrol for a diploma in nursing. In addition, there are a variety of postgraduate diplomas available that will lead to registration at the SANC on successful completion, as well as master and doctoral degrees (SANC, 2016).

5.2.1.1.2 Variable 2: Medication training

It was alarming to notice that the high response rate of study participants not receiving medication training in the last year is n=80 (65.0%). Of these n=80 (65.0%) a total of n=43 (35.0%) did not receive training in the last five years, as indicated in Chapter Four (4), Table 4.5. This was even though residential facilities for older persons must provide in-service training sessions on medication management to all their health professionals twice a year (Department of Health, 2011a:12). Especially the ENAs appeared to receive limited training on the side effects of common medications, as indicated by n=14 (50.0%), Chapter Four (4), Table 4.6. Also, training on what common medications did appear to be focused on RNs n=51 (85.0%) in contrast to the ENAs n=17 (60.7%), as displayed in Chapter Four (4), Table 4.7.

More so, when providing training on checks performed before medication administration, such as pre-issue pulse recording for Digoxin, regular blood pressure monitoring for residents on blood pressure medications, and glucose monitoring for insulin, the ENAs self-reported that n=24 (85.7%) did not receive training in the last 12 months, versus the RNs n=37 (61.7%) and ENs n=23 (65.7%), as seen in Chapter Four (4), Table 4.8. This medication in-service training is crucial to keep staff up to date, as literature showed that there could be weaknesses in the nurses' curricula. The findings from a study in Botswana emphasised that the curricula focused mostly on pharmacology courses, but a lack of exposure to real-life situations occurred (Tshiamo *et al.*, 2015:18–23). Also, a mixed-method study showed that 30% of nurses self-proclaimed their lack of knowledge on medication interaction and the interaction of medication with food (Dilles *et al.*, 2011:171–180).

5.2.1.1.3 Variable 3: Computer training

Various research studies indicated that the use of technology in medication administration is increasingly used to help prevent medication errors (Al-Jumaili & Doucette, 2017:470–488;

Carayon, Wetterneck, Cartmill, Blosky, Brown, Kim *et al.*, 2014:56–65; Szczepura *et al.*, 2011:1–10). For this reason, the data collection included study participants' training and experience in the use of computers. Of the N=123 (100%) participants, n=15 (25.0%) of RNs and n=8 (22.9%) of ENs received formal computer training, in contrast to only n=2 (7.1%) of ENAs. A study by Ventola (2014:356–364) found that health workers appeared reluctant to use software applications in practice, despite the benefits of assuring the safety of residents. Since the data collection instrument for this study was initially only paper-based, the COVID-19 pandemic necessitated a minor amendment to the study protocol to include data collection online (Department of Co-operative Governance and Traditional Affairs, 2020c). After gaining permission from facilities for data collection, a shortened link was sent to facility managers. However, various managers responded with reasons from nurses which ranged from the absence of access to computers, no access to data bundles, not knowing how to log into a Google Account, and not understanding how to complete the questionnaire on their cell phones. As a result, n=59 (48.0%) of study participants completed online questionnaires, whilst n=64 (52.0%) requested paper-based questionnaires. According to Kuek and Hakkennes (2020:592-612), health information technology can increase the effectiveness of preventative care and healthcare in its entirety. Skills needed by healthcare workers include typing and the use of a computer with a keyboard and mouse. Also, Szczepura *et al.* (2011:1–10) states that paper-based medication administration records have been replaced widely by electronic medication administration recording systems to assist with the limitation of medication administration errors. Therefore, the lack of skills such as the use of a computer with a keyboard and mouse and these resources could possibly be detrimental in this digital age. Tshiamo *et al.* (2015:18–23) also emphasised the importance of continuous professional development such as internet use (Tshiamo *et al.*, 2015:18–23). Discussing the data analysis of study participants' experience in computer use will follow under Section 5.2.3.3.2.

5.2.1.1.4 Variable 4: Sources of job pressure in the workplace

The WHO (2003:5) described the cause of job or work stress as a discrepancy between the pressures of the work versus the abilities and knowledge of the worker. Especially when the workers feel they can exert little control over their work and receive minimal support from colleagues or their supervisors, it could compromise their ability to cope (World Health Organization (WHO), 2003:5). When combining the scores of *"medium and high"* sources of job pressures in the workplace as seen in Chapter Four (4), Table 4.10, both the ENAs n=27 (96.4%) and the ENs n=25 (71.4%) as a nurse category perceived increased workloads as the source of the most pressure. RNs appeared to experience lower stress due to increased workloads, n=41

(68.3%). A study in Canada confirmed extreme workload and time constraints as the biggest challenges that influence all the stages of the medication process (Ellis *et al.*, 2012:128–149).

Dealing with problem residents appeared to be the highest source of job pressure for RNs, n=45 (75.0%), while the ENs n=21 (60.0%) and ENAs n=16 (57.1%) perceived this as slightly less of a source of job pressure (Chapter 4, Table 4.10). It is interesting to note that this broad concept could include a multitude of causes that led to nurses perceiving residents as “problem residents”. One study identified this as patient-related barriers and confirmed that nurses perceived residents with limited mental or intellectual capacities, as well as multifaceted pathologies, as highly relevant patient-related barriers (Dilles *et al*., 2011:171–180). Also, multiple studies confirmed the pressure on nurses caused by polypharmacy, where residents took two to nine different medications per day, and inappropriate medications as high as 62.5% (Dagli & Sharma, 2014:1–2; Metsälä & Vaherkoski, 2014:12–28).

Following dealing with problem residents, paperwork was the second-highest source of job pressure for the RNs, n=42 (70.0%), while ENs n=22 (62.8%) and ENAs n=17 (60.7%) perceived this as lower sources of job pressure (Chapter 4, Table 4.10). Literature supports that nurses experience paperwork as unnecessary amounts of documentation and a barrier (Ellis *et al.*, 2012:128–149). Dealing with conflict within the facility was the second-highest source of job pressure for both the ENAs n=27 (96.4%) and the ENs n=25 (71.4%), although the RNs n=37 (61.6%) experienced this job pressure slightly lower (Chapter 4, Table 4.10). Also, increased demands from residents cause almost similar job pressure across the three nurse categories, RNs n=38 (63.3%), ENs n=22 (62.8%), and ENAs n=17 (60.7%) (Chapter 4, Table 4.10). It was interesting to note that study participants experienced little job pressure due to combining work with their home setup. Across the three nurse categories, they rated family disturbance, dividing time between work and spouse/family, working environment and home setup, and unsociable hours between 3.5% and 35% as sources of job pressure. Furthermore, when again combining the scores of *“medium and high”* sources of job pressures in the workplace as seen in Chapter Four (4), Table 4.10, fear of assault at work caused the least job pressure for all three nurse categories, at n=12 (9.8%). This was comforting when considering the crime rate in the WCP with contact crimes (murder, attempted murder, sexual offences, assault with intent to cause grievous bodily harm, common assault and robbery, and robbery with aggravating circumstances) as high as 113 508 cases in 2019/2020 (South African Police Service, 2020).

Job pressures could have far-reaching consequences for staff, as a study in the United Kingdom found. With staff shortages occurring in as much as 20% of nursing homes, especially staff with long service records appeared to be affected most by the pressure. This could be due to nurses' managerial duties, administrative duties, supervisory roles and support role to other staff, consequently experiencing a decline in their physical health, and even more in their psychological well-being (Islam, Baker, Huxley *et al*., in press).

In summary, four variables were discussed to reach objective *RO.1*: To determine the socio-biographical data related to nurses working in the specified residential facilities for older persons within the Metro-North, Western Cape Province. The biographical data of nurses indicated a more mature workforce who were experienced in residential care for older persons. Results indicated that most RNs received a diploma level education, and medication training could be insufficient in providing nurses with up to date knowledge. Also, participants received limited computer training which could impact the use of technology in the residential facilities for older persons within the Metro-North, WCP. Lastly, participants experienced various sources of job pressure in the workplace. The highest sources of job pressure according to the study's results, were increased workloads, dealing with problem residents, paperwork, and dealing with conflict in the facilities.

As a *structure* or input measure, this socio-biographical data related to nurses working in specified residential facilities for older persons within the Metro-North, WCP, could impact the process of medication administration (Donabedian, 2005:691–729). In addition, organisational resources and infrastructures were also structural measures, according to the conceptual framework of this study which will be addressed in research objective 2 (RO.2) (Donabedian, 2005:691–729).

5.2.2 Objective RO.2: Investigate the type of organisational resources and infrastructures in specified residential facilities for older persons within the Metro-North, Western Cape Province.

This latter part of Component No 1 as listed in Chapter Four (4), Table 4.1, includes a discussion of the organisational infrastructures and resources as structural measures as they relate to the medication administration process (Donabedian, 2005:691–729).

5.2.2.1 Section A2: Organisation infrastructures and resources

To investigate the type of organisational resources and infrastructures that may have an impact on the medication administration processes, the data collection instrument contained several

questions regarding medication storage systems and MAR chart folders. The purpose was to obtain the participant's perceptions of the difficulties they experienced with these systems.

5.2.2.1.1 Variable 5: Medication storage systems

Almost half of the participants perceived that the racking/storage system presented some difficulties, n=56 (45.5%), and especially the ENAs, n=21 (75.0%) found it challenging as seen in Chapter Four (4), Table 4.11. The biggest challenge for study participants across all three nursing categories was that they found blisters in the incorrect order, n=68 (55.3%). Almost half of the participants also found residents' blisters in the wrong section of the racks, n=61 (49.6%). These challenges for participants appeared to be more linked to organisational skills than experiencing difficulties with their specific racking/storage systems. Popping the tablets from the racks presented little challenges to participants, as only n=14 (11.4%) indicated *"no"*, to it was not easy to pop tablets from the racks. Sustaining injuries to fingers when opening blisters were the least challenging to study participants, as only n=10 (8.1%) indicated this could be difficult (Chapter 4, Figure 4.3).

Automated dispensing units (ADUs) and blister packs as a resource are increasingly more used in residential facilities for older persons in South Africa. Especially chronic medication packed together in designated sealed compartments, as discussed in Chapter Two (2), Section 2.4.3, provides a method to administer medication that is less time consuming and increases adherence. However, it is not surprising that half of the participants, n=62 (50.4%) found the systems bulky (Chapter 4, Figure 4.3). Although facilities could purchase specially designed medication trolleys for the blister packs, it still provided challenges concerning certain medicines that require storage in a drug cupboard, with limited space (Department of Health, 2011a). In practice, most facilities receive stock for two weeks, and for example, with only fifty (50) residents this amounts to 100 containers to store on-site. However, the convenience of using blister packaging was confirmed by Bardage *et al.* (2014:1–10), who found that with using automated multi-dose drug-dispensing units in Sweden, 77% of nurses, 66% of physicians, and 60% of assistant nurses agreed that these systems were mainly used for staff convenience.

5.2.2.1.2 Variable 6: MAR chart folders

The paper-based MAR chart folder as a resource in the medication administration process scored low in terms of difficulties that participants experienced as seen in Chapter Four (4), Figure 4.4. Only n=18 (14.8%) found the MAR chart folders too bulky, and only n=13 (10.6%) found it difficult

to find residents' charts in the folder. It appeared that charts sliding out of the folder due to the holes that got damaged, was a greater concern, as indicated by n=33 (26.8%).

To reach objective *RO.2*, this section investigated the type of organisational resources and infrastructures in specified residential facilities for older persons within the Metro-North, WCP, as it relates to medication administration. Difficulties with medication storage systems were highlighted, especially the bulky storage systems. Also, the challenges that study participants experienced with blisters in incorrect order and wrong sections of the racks were discussed. A second resource included in this section were the MAR chart folders, which presented minimum difficulties to the study participants. This concluded the discussion of Component No 1: Structural measures, including nurses as resources and organisational infrastructure and resources, to meet objectives *RO.1* and *RO.2*.

5.2.3 Objective RO.3: Identify the medication administration process followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, Western Cape Province.

Following the first *structural* component in Sections 5.5.1 and 5.5.2, the second component in Donabedian's Quality of Care Model as the foundation in this research study is the *process* component (Donabedian, 2005:691–729). The process component comprises all the practices relating to the quality of care and hence the objective as set as *RO.3* was to determine if processes were properly applied. Three sub-categories will be discussed separately, namely medication policies, medication management processes, and lastly, the use of technology.

5.2.3.1 Section B1: Medication policies

In South Africa, the National Department of Health provides policy guidelines for medication management in residential facilities for older persons (Department of Health, 2011a). The aim of this policy is to guide the facilities in the development of their own medication management policies. These policy guidelines address the responsibilities of nurses at the facilities, and states specifically that facilities must indicate the positions of the staff and their responsibilities regarding medication administration. The policy also indicates clearly that medication administration must be strictly aligned with the scope of practice of the nurses (Department of Health, 2011a). In addition to the responsibilities of nurses, the policy states that facilities must include the supervisory role of RNs, prescription of medications, ordering and storage of medication, standard operation procedures for medication administration, disposal of redundant medications, provision

of medication training and the management of medication errors (Department of Health, 2011a). As the intention of medication policies are to guide nurses in practice it is imperative that policies are available to the nurses, that it is read frequently, and that the medication policies are accessible to the nurses including after office hours (Lindblad *et al.*, 2017:598; Vogelsmeier, 2011:49–55).

5.2.3.1.1 Variable 7: Availability of policies

Literature suggests that all institutions must have medication policies covering all five phases of the medication process, as discussed in Chapter Two (2), Section 2.4.1, to guide nurses (Lindblad *et al.*, 2017:598; Vogelsmeier, 2011:49–55). In South Africa, the National Department of Health provides medication policy guidelines for residential facilities for older persons to develop their institutional policies (Department of Health, 2011a). Therefore, it was a concern that n=16 (13.0%) of study participants were unsure if they had recognised medication policies in their facilities, considering that n=120 (97.5%) of the study participants already had more than 12 months' work experience as seen in Chapter Four (4), Tables 4.4 and 4.12. Also, n=2 (1.6%) indicated that they did not have recognised medication policies in their facilities as indicated in Chapter Four (4), Table 4.12. The results of a systematic review in North America determining the frequency of medication errors resulting in hospitalisation and death showed that faulty policies can contribute to as much as 6% of medication errors (Ferrah *et al.*, 2017:433–442).

5.2.3.1.2 Variable 8: Frequency of reading policies

The responses to this question in Chapter Four (4), Figure 4.5, indicated that there were minimal requirements for nursing staff to read the policies at any specific periods in the selected residential facilities for older persons in this research study. A total of n=17 (13.8%) of participants were only required to read these policies when starting at the facility. This was a concern when considering that n=34 (27.6%) of staff participants already had more than nine years of work experience as seen in Chapter Four (4) Table 4.4. Also, n=34 (27.6%) indicated that no periods for reading these policies were specified. The South African National Department of Health prescribes at least six-monthly in-service training on medication management for all health professionals of the facility (Department of Health, 2011a). As discussed in Chapter One (1), Section 1.2, ENAs are also utilised for medication administration in certain facilities, which is not aligned with their scope of practice. The scope of practice of ENAs in South Africa includes the provision of elementary nursing care under the supervision of the RN (RSA, 2005:25; SANC 1984:12). In total, n=19 (15.4%) of participants indicated that they indeed received training in the last six months, of whom

n=10 (16.6%) was RNs, n=7 (20.0%) ENs, and n=2 (7.1%) ENAs. The results indicate that although working out of their scope of practice, the ENAs also receive some medication training. Since there appeared to be a small number of participants, n=25 (20.3%), reading the policies beyond the mandatory six-monthly training as indicated by the South African National Department of Health (Department of Health, 2011a). These study findings suggested that participants' medication knowledge could be out of date, and this could potentially increase medication errors.

5.2.3.1.3 Variable 9: Storage of policies

The study findings showed that medication policies were almost equally stored between the frail care units n=46 (37.7%) and the RN's office n=43 (35.2%) as seen in Chapter Four (4), Table 4.13. Medication rooms appeared the least favourite place to store medication policies, as only n=16 (13.1%) selected this option. One must question the feasibility of storage of medication policies in the RN's offices, as this could limit access for the other nurse categories, such as the ENs and ENAs.

The three variables namely the availability of medication policies, frequency of reading these policies, and the storage of these policies were discussed to reach objective *RO.3*: To identify the medication administration processes followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, Western Cape Province. The discussion of the study's results identified gaps in terms of all three variables which could impact the medication administration phase. A discussion of the medication management process will follow in the next section, section B2.

5.2.3.2 Section B2: Medication management process

Authors described the medication management process as five phases, including prescribing and ordering, transcribing, dispensing, administration, and monitoring (Al-Jumaili & Doucette, 2017:470–488; Ferrah *et al.*, 2017:433–442). Some authors include a sixth phase, the preparation of medication (Carayon *et al.* 2014:56–65). In line with the objectives of this study, the focus of this discussion was on the medication administration phase and recordkeeping.

5.2.3.2.1. Variable 10: Medication administration

Medication administration includes a review of the accuracy of the medication order, performing checks to identify possible allergies or drug interactions, an assessment of the resident, giving the medications to the resident, an assessment of the resident's response to the medications, and lastly documentation of the process (Ferrah *et al.*, 2017:433–442). After the prescription of

medication, the first step would be to obtain the stock. Therefore, participants were asked to identify the pitfalls or problems they associated with their methods of medication stock control. The sole biggest challenge to study participants, n=88 (71.5%), was that it was time-consuming as seen in Chapter Four (4), Figure 4.9. However, the Pearson's Chi-square test with a p = .014 showed no correlation between participants' perception that their medication stock control systems were time-consuming, and that the storage systems presented some difficulties as reported by n=56 (45.5%) (Chapter 4, Figure 4.9 and Table 4.11). The second biggest challenge was that participants ran out of stock before their next order, n=39 (31.7%), as seen in Chapter Four (4), Figure 4.9. The researcher deduced from the study results that it could imply poor control systems.

When analysing the data regarding the frequency of medication administration, results were as anticipated: most participants administer 9 to 12 rounds per week, during most day shifts per week as seen in Chapter Four (4), Table 4.15. It appeared there was a greater utilisation of lower categories of nurses during night shifts, as n=9 (32.1%) of ENAs reported they administered medications during night shifts, and a further n=7 (25.0%) of ENAs reported that they administered medication in emergencies and when staff shortages occurred as shown in in Chapter Four (4), Table 4.15. This was consistent with the results of a study in Norway, suggesting when a shift only has one nurse, he or she will be affected by the skills of the surrounding staff and will undertake most of the so-called non-clinical tasks such as medication and administrative tasks (Odberg, Hansen & Wangensteen, 2018:384–392). This phenomenon was further supported by the study findings where n=23 (82.1%) of the ENAs carried drug rounds out alone. However, when using the Pearson Correlation test, the p = .917 showed that there was no significant difference between the nurse categories and whether they carry out the drug round alone.

Even though ENAs conducted drug rounds alone (Chapter 4, Table 4.17), they appeared to feel fairly at ease in doing so n=21 (75.0%) as seen in Chapter Four (4), Table 4.18. This was even though the ENAs n=28 (100%) indicated that they only *sometimes* knew the purpose of the drugs (Chapter 4, Table 4.14). Also, statistical tests showed no correlation between how at ease participants felt with conducting drug rounds alone and their level of education (Chapter 4, Tables 4.18 and 4.2). The results from a study conducted by Szczepura *et al.* (2011:1–10) in England also found that staff were at ease with carrying out the drug rounds on their own.

Odberg *et al.* (2018:384–392) noted in their qualitative study that nursing assistants viewed medication administration as a straightforward task, by portraying it as only two phases, namely

preparing and administering medication instead of the full spectrum of five to six phases. The lack of nurses' knowledge of medication was widely documented by multiple authors (Al-Jumaili & Doucette, 2017:470–488, 2018:1420–1427; Dilles *et al.*, 2011:171–180; Ellis *et al.*, 2012:128–149; Szczepura *et al.*, 2011:1–10). This lack of knowledge was also reflected in this study by the relatively low number of study participants performing pulse checks before administering medication such as Digoxin n=49 (39.8%) and monitoring blood pressures before administering antihypertensive medications n=75 (61.0%) as seen in Chapter Four (4), Figure 4.10.

The time frame for most morning and evening rounds was >30 minutes – ≤ 1 hour, as showed by n=94 (76.4%) of the study participants for morning rounds and n=76 (61.8%) for evening rounds. The lunch hour rounds appeared to be shorter as n=100 (81.3%) stated that these rounds took less than 30 minutes. These findings were supported by the literature stating medication rounds could take up one-third of the nurses' workdays, which could be between 2.5 and 4.5 hours per day (Qian *et al.*, 2015:427–434; Szczepura *et al.*, 2011:1–10).

The most frequent individual system that study participants used for dispensing medication was by using a trolley taken directly to the residents, n=63 (51.2%), as seen in Chapter Four (4), Figure 4.6. However, when study participants used a combination of methods as indicated by n=31 (25.2%) across the three nurse categories, a further n=23 (18.7%) prepared medication in advance in the nurses' office and carried the pill dispensers to residents. This method was mainly used by ENAs n=9 (32.1%) as shown in Chapter Four (4), Figure 4.7. This correlated with what the researcher noticed in practice, where the RNs will prepare the medication in advance in pill dispensers, for later administration to residents by other categories of nurses, especially during night shifts and weekends.

An important finding of the study was that when administering medications, n=39 (31.7%) of the study participants agreed that there was a *risk* in their facilities of staff assuming that the **content** of blisters/containers were correct and therefore did not warrant thorough checking (Chapter 4, Table 4.19). Especially the ENAs, n=15 (53.6%), perceived this as a risk in their facilities (Chapter 4, Table 4.19). In total, n=95 (77.2%) of study participants had the perception that staff would just *assume* that the content of blisters/containers were correct and did not warrant thorough checks (Chapter 4, Table 4.21). This was even though n=102 (82.9%) of the study participants *did come across* incorrect content of blisters/containers when administering medications (Chapter 4, Table 4.20). When considering the "five rights" of medication administration and that scrutiny of the content of medication containers was a fundamental principle in medication administration, as

described in Chapter Two (2), Section 2.5.2, it is troublesome that such a high portion of the staff just assume that the content of containers would be correct.

One of the "five rights" of medication administration includes the checking of containers to confirm the correct medication and dose, to ensure that the medication is not out of date (Department of Health, 2011a; Grissinger, 2010:542). Of the study participants, n=64 (52.0%) agreed that there was a *risk* in their facilities of staff assuming that the blisters/containers are **up to date** and did not warrant thorough checking (Chapter 4, Table 4.22). Again, n=19 (67.9%) of the ENAs perceived this as a risk in their facilities. In total, n=92 (74.8%) of study participants had the perception that staff would just *assume* that the blisters/containers were up to date and did not warrant thorough checks (Chapter 4, Table 4.24). This was even though n=93 (75.6%) of the study participants *did come across* out of date blisters/containers when administering medications (Chapter 4, Table 4.23).

With the storage of medication, the medication management policy from the South African National Department of Health specify the storage of medication in rooms that are double locked, or in individual cupboards in residents' rooms, kept separately, and in original containers that are clearly marked with personal identifiers (Department of Health, 2011a:4). When considering assumptions and risks related to blisters/containers being in the **correct residents' sections**, n=80 (65.0%) identified this as a potential *risk* in their facilities (Chapter 4, Table 4.25). Almost three-quarters of study participants, n=92 (74.8%), had the perception that staff would just *assume* that the blisters/containers were in the correct residents' sections and as a result, they did not make thorough checks (Chapter 4, Table 4.27). In this instance, there were n=87 (70.7%) of the study participants who *did come across* blisters/containers in incorrect residents' sections, therefore increasing the risk of making medication errors (Chapter 4, Table 4.26).

In addition to medication that must be stored in the correct resident sections, it must also be stored in the correct cupboards (Department of Health, 2011a:4). In the administration of medication, there is an increased *risk* that medication can be missed out of the normal drug administration system when **interim medications are supplied mid-month** and placed in **incorrect positions on racks**. Only about a third of the study participants identified this as a *risk* in their facilities, as seen in Chapter Four (4), Table 4.28 n=39 (31.7%), and only n=40 (32.5%) *had seen* medication being missed under these circumstances (Chapter 4, Table 4.29). Results suggested that participants did perform checks to establish that interim medications supplied mid-month were placed in correct positions on racks, as n=59 (48.0%) did notice blisters/containers in incorrect

positions before administration (Chapter 4, Table 4.30). Concerning missing interim medications that are supplied mid-month because it was stored in incorrect positions on racks, these medications could be missed because they were not blistered and therefore **stored elsewhere** such as in fridges. Again, it appeared that study participants perceived the missing of medication under these circumstances as a relatively low *risk*, n=45 (36.6%) as displayed in Chapter Four (4), Table 4.31. This correlated with the fact that only n=46 (37.4%) of study participants had *seen* this happening (Chapter 4, Table 4.32).

Redundant medication must be stored in separate secured locations until the disposal thereof (Department of Health, 2011a:4). Additionally, more than half of study participants, n=67 (54.5%) perceived it to be a *risk* for incorrect medication administration in their facilities when dose changes occur and the **redundant blisters/containers remained on the racks,** or an increased medication dose was not added to the blisters/containers on the racks (Chapter 4, Table 4.33). This was aligned with the number of study participants, n=69 (56.1%), who noted that the redundant medication was not removed, or the additional doses not added as seen in Chapter Four (4), Table 4.35.

When considering nurses' responsibilities towards residents to administer medication on time, it could present a challenge in residential facilities for older persons (Grissinger, 2010:542). When older persons are mobile, **they are not always there** when it is their turn to receive medication. Missing of medication under these circumstances was perceived as a *risk* by more than half of the study participants, n=64 (52.0%) as seen in Chapter Four (4), Table 4.35, while n=57 (46.3%) had confirmed that they have *seen* this happening (Chapter 4, Table 4.36). Moreover, only n=18 (14.6%) of study participants made a note on the MAR to record this event (Chapter 4, Table 4.37). Most of the study participants, n=87 (70.7%), would check the blisters/containers at the end of the medicine round to confirm if all residents indeed received their medications (Chapter 4, Table 4.37). To clarify, most of the study participants during the pilot study reported that they stored the containers separately or on top of the medication trolley as a reminder to themselves. Half of the study participants, n=63 (51.2%), preferred to write on a notepad as a reminder to still administer these outstanding medications (Chapter 4, Table 4.37).

Each resident must have her/his own medication that are separated from one another (Department of Health, 2011a:4). However, the feedback from participants, n=103 (83.7%), showed that they perceived the running out of residents' stock as the main **reason for sharing** other residents' medications (Chapter 4, Figure 4.11). More than half of the study participants, n=64 (52.0%), proclaimed that they saw this event fairly frequently (Chapter 4, Table 4.38). This

could suggest poor medication stock control by the nurses. Also, when residents had multiple MARs, and additional interim MARs were placed at the back of existing sheets, it posed a risk that residents' medication could be missed. It was therefore reassuring that the study findings showed in Chapter Four (4), Table 4.39 that participants perceived this situation as something that would rarely happen, n=80 (65.0%).

Lastly, it was expected of nurses to verify medication changes after their days off, as it remains the nurses' responsibility to ensure adherence to the "five rights" of medication administration (Grissinger, 2010:542). Consequently, it was a concern that the study results showed such a high percentage of study participants opting for the choice to rather discuss the changes with their colleagues, n=104 (84.6%), than to study the MAR charts themselves, n=60 (48.8%) as shown in Chapter Four (4), Table 4.40. This passive approach of relying on colleagues for information and verification of medication changes after days off could increase the margin for medication errors.

5.2.3.2.2 Variable 11: Recordkeeping

Recordkeeping is specified as the signing of the medication administration record (MAR) directly after giving medication and it is swallowed by the resident, and the recording of any doses not administered including the reasons. With schedule 5 and 6 medications in South Africa, the nurse administering these medications must do so in the presence of a second nurse. The first nurse is required to sign for the administration of these medicines, while the second nurse sign as witness in the specified scheduled registers (Department of Health, 2011a:5). Recordkeeping was the last phase in the medication administration process. As such, the authors identified one of the most common factors that contributed to medication errors were when records were incomplete or lacking (Andersson *et al.*, 2018:354–362).

Study findings in Chapter Four (4), Table 4.41 showed that almost equal accountability and responsibility for making changes to MAR charts were assigned to doctors, n=80 (65.0%), and RNs, n=76 (61.8%). These changes included dosage changes and discontinuation of medications. An interesting phenomenon was that both RNs, n=11 (18.3%), and ENs, n=8 (22.9%), assigned these accountabilities and responsibilities to ENs as indicated in Chapter Four (4), Table 4.41. This was even though the ENs were required to work under the supervision of RNs (SANC, 1984).

When changes were made to the MAR charts, the study participants were asked whether they provided signatures. To this effect, Chapter Four (4), Table 4.42 showed only n=108 (87.8%)

revealed that this was a requirement in their facilities. Also, n=47 (38.2%) of study participants stated that a witness signature was not required when making amendments to the MARs (Chapter 4, Table 4.43). This was confirmed by the results, which showed that n=100 (81.3%) of study participants had indeed seen medication changes made that were not signed by two people (Chapter 4, Table 4.45).

Another challenge that occurred in recordkeeping was Illegible handwriting and the deciphering thereof. To prevent incorrect deciphering of handwritings it must be legible, clear, and concise (Brits, Botha, Niksch, *et al.*, 2017:52–55). According to Brits *et al*. (2017:52–55) in their study, 20% of their study participants deciphered a prescription for Lorazepam injection 4mg as 40mg, which construed a dose lethal to a patient. The high incidence of n=103 (83.7%) of study participants who identified this as a challenge in Chapter Four (4), Table 4.46, was consistent with the findings of Metsälä and Vaherkoski (2014:12-28) that illegible handwriting and the deciphering thereof provided further barriers to nurses in the medication administration process. Inabilities to decipher handwriting could therefore possibly lead to medication errors (Brits *et al.*, 2017:52–55; Metsälä & Vaherkoski, 2014:12–28).

When disclosed to study participants that health auditors looked for reasons why certain actions were not recorded, such as missing entries, not providing reasons for non-administration, and not recording the number/dosage of “pro re nata” (PRN) medications, the combined highest response to all three questions elicited an answer of *“people forget”,* n=94 (76.4%). The second most common reason for all three scenarios, was *“time pressure”,* n=50 (40.6%) with *“not enough space on the MARs”* the reason that received the least consideration n=12 (9.7%) as seen in Chapter Four (4), Figures 4.12, 4.13 and 4.14. These results suggested that the failure to record actions were more connected to behavioural factors and a lack of accountability and were not necessarily resource related.

Further related to omissions on medication documentation was the adherence to procedures of signing the MAR charts. Only n=102 (82.9%) indicated that they signed the MAR sheets after giving medicines from blisters or containers, as displayed in Chapter Four (4), Table 4.47. A total of n=5 (4.1%) conceded that they signed the MAR charts before administering the medications. As participants noted that they also dispensed medications from pill dose containers that had been packed earlier for administration at a later stage, n=63 (51.2%) conceded to signing the MAR charts after administering the medication from the pill dose containers as indicated in Chapter Four (4), Table 4.47. This high-risk behaviour was in direct violation of the Health Norms

and Standards of the Department of Social Development, Western Cape, which prohibits decanting (Department of Social Development, 2015). As observed during the four years of the researcher's work as a health auditor, these medications are decanted from the original containers into pill dose containers for one day up to seven days. The person decanting the medication was most often one of the nurses (not a doctor or pharmacist), and a different person administers the medication at a later stage. Pill dose containers were frequently only labelled with a first name, without corresponding documentation reflecting the content. This then results in the second person administering the medication without knowledge of the content, and consequently without checking a doctor's prescription against these medicines. Also, the signing of MAR charts together at the same time, i.e., mass signing, appeared to be frequent safety errors. More than half of the study participants indicated that they had indeed witnessed the mass-signing in their facilities, n=69 (56.1%) as shown in Chapter Four (4), Table 4.48.

Medication policies and the medication management process were discussed as part of the *process* component to reach objective *RO.3*: To identify the medication administration processes followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, Western Cape Province. This discussion included the availability of policies, the frequency of reading thereof, and the storage of the policies. Also, the medication administration processes followed or applied by study participants were discussed, as well as the completion of records. The discussion of these variables indicated numerous shortcomings in the way nurses followed and applied medication administration processes in the specified residential facilities for older persons within the Metro-North, WCP.

5.2.3.3 Section B3: Use of technology

Technology is increasingly used in medication management, and specifically medication administration, to reduce medication errors. The benefits as well as challenges regarding the use of BCMA, computerised prescriber order entry, computers and mobile phones, were documented in various research publications (Carayon *et al*., 2014:56–65; Shah *et al.*, 2016:394–402; Szczepura *et al.*, 2011:1–10; Ventola, 2014:356–364; Wallace *et al.*, 2012:1–7). In this study, the focus was on the integrated use of computers and mobile phones in the workplace as devices to assist in reducing medication errors.

5.2.3.3.1 Variable 12: Computers at home

A study in Turkey concluded that computer use could improve healthcare practices since it led to improved competencies and also decision-making skills (Topkaya & Kaya, 2014:141–149).

However, it appeared as if nursing students received inadequate information technology competencies during their nursing training and had to use their initiatives to acquire these computer skills (Topkaya & Kaya, 2014:141–149). Tshiamo *et al.* (2015:18–23) confirmed these findings and stated that continuous professional development in the use of technology such as the internet was increasingly important for nurses. As reported in Chapter Four (4), Table 4.9, only n=25 (20.3%) of participants in this study received formal computer training. When thus examining the extent to which study participants used computers at home, the results pointed to below-average usage. The distribution of study participants across the three nursing categories was almost similar between those who never used computers at home, n=46 (37.4%), and those who used a computer daily, n=45 (36.6%) as seen in Chapter Four (4), Table 4.49. The results showed that the RNs used computers the most, where n=31 (51.7%) indicated daily use. Almost three-quarters of ENAs, n=20 (71.4%), never used computers at home, in contrast with slightly less than half of the ENs who never used computers at home, n=15 (42.9%) as seen in Chapter Four (4), Table 4.49. The study results showed in Chapter Four (4), Figure 4.15 the most frequent tasks completed on home computers as email, n=67 (54.5%), and information gathering, n=55 (44.7%). Study participants appeared to use a home computer the least for social media, n=12 (9.8%).

5.2.3.3.2 Variable 13: Computers at the workplace

At the workplace, health information technology can increase the effectiveness of preventative care and healthcare in its entirety. It is therefore imperative for nurses to be digitally literate in this digital age (Kuek & Hakkennes, 2020:592–612). Ventola (2014:356-364) supports this statement but also reported the apparent reluctance of healthcare workers to use software applications. In this study as seen in Chapter Four (4), Table 4.50, the use of computers at the workplace showed a similar distribution between study participants not using computers at all, n=58 (47.2%), and those who used computers daily, n=58 (47.2%). Across the three nurse categories, only n=1 (3.6%) of the ENAs used a computer at work. Of those study participants using a computer at work (in Chapter 4, Table 4.51), it was equally used for patient records, n=53 (43.1%), and work email, n=53 (43.1%). To a lesser degree, study participants used computers at work for the gathering of information n=40 (32.5%).

With an increasing amount of healthcare facilities implementing electronic health records, a lack of computer experience could be an obstacle in the use of electronic health records (Topkaya & Kaya, 2014:141–149). Study results Chapter Four (4), Table 4.52 indicated that n=58 (47.2%) of

participants were fairly to very inexperienced, n=44 (35.8%) was average, and only a total of n=21 (17.1%) was fairly to very experienced. These results were not unlike a study in a community hospital in America regarding nurses' computer literacy levels. When asked about their experience in 15 software and hardware items, these nurses reported that they had little or no experience in at least seven of the items (Campbell & McDowell, 2011:365–370). Also, a study done by Kuek and Hakkennes (2020:592–612) found that clinical staff over 50 years of age had lower computer literacy skills and higher anxiety levels when using computers than clinical staff under 50 years of age. When comparing the ages of participants in this study a seen in Chapter Four (4), Figure 4.1, where n=22 (19.3%) was between 61 years and 77 years, to the results of the study by Kuek and Hakkennes (2020:592-612), it could also result in challenges to the staff at the selected residential facilities for older persons in this study.

5.2.3.3.3 Variable 14: Mobile phones

Concerning the use of mobile phones, a total of n=86 (69.9%) of the study participants reported that they could use their mobile phones for work purposes as displayed in Chapter Four (4), Table 4.53. Study participants used their phones mostly for texting n=79 (64.2%), instant messaging n=61 (49.6%), and to a lesser extent, for making work-related calls n=54 (43.9%) as shown in Chapter Four (4), Table 4.54. Ventola (2014:356-364), listed tasks that healthcare workers can utilise their mobile phones for as, among others, for gaining clinical information, accessing literature, monitoring of residents' health, and drug references to check possible drug interactions. The limited use of these devices to gather work-related information n=18 (14.6%), using mobile phones as calculators n=34 (27.6%), or using these devices to set reminders for on-time medication administration n=22 (17.9%) may therefore suggest an underutilisation of mobile phones by the study participants in medication administration processes.

However, allowing nurses to use their mobile phones for work purposes brought its challenges. A concern raised by authors was the protection of personal data and the possibility of compromising the confidentiality of patients (Ventola, 2014:356–364; Wallace *et al.*, 2012:1–7). In South Africa, all health workers have a responsibility according to the Protection of Personal Information Act 14 of 2013 to protect all identifiable private information of people (RSA, 2013:15). Wallace *et al.* (2012:1–7) also reported the additional concern of possible exceeding the boundaries between personal and professional life. This study in Canada by Wallace *et al.* (2012:1–7) reflected that 60% of the student participants perceived it would be beneficial to have a policy on smartphone usage to address compromised professional behaviour.

As seen in Chapter Two (2), Section 2.4.3 nursing homes and residential facilities globally used different electronic safety systems to promote safer medication administration. These ranged from electronic medication administration records, BCMA, computerised prescriber order entry, other tools such as the ADE trigger tool and software like Pharma Nurse (Agency for Healthcare Research and Quality (AHRQ), 2020; Al-Jumaili & Doucette, 2017:470–488; Shah *et al.*, 2016:394–402; Szczepura *et al.*, 2011:1–10; Topkaya & Kaya, 2014:141–149). These studies indicated that these tools could be valuable in detecting potential errors before they happened, provided that they were used correctly by staff (Szczepura *et al.*, 2011:1–10). Unfortunately, studies also indicated that it was underutilised (Al-Jumaili & Doucette, 2017:470–488). Therefore, an exploration of ways to expand nurses' information technology competencies in the residential facilities for older persons seems merited.

In summary, section B3 included a discussion of the use of technology, specifically the use of computers and mobile phones. The aim was to determine how these devices were used and applied by study participants in the medication administration process. With the identification of the medication administration processes followed or applied by nurses working in specified residential facilities for older persons within the Metro-North, WCP (research objective *RO.3*), results indicated possible underutilization of these devices as assistive tools.

Together, the medication policies, the procedures applied by study participants during the administration of medication, recordkeeping, and the use of computers and mobile phones as *process measures*, linked *structure measures* (Component No 1, Table 4.1) to *outcome measures* (Component No 3, Table 4.1). In the ensuing section, a discussion of the outcome measures will follow to address the last research objective, *RO.4*.

5.2.4 Objective RO.4: Provide evidence of factors associated with medication errors in the elderly within the specified residential facilities for older persons in the Metro-North, Western Cape Province, as provided by the nurses.

The *outcome* component was used to measure the effect of care on residents and comprised possible changes to residents' health status and the possible implications of medication errors for residential facilities for older persons (Donabedian, 2005:691–729).

5.2.4.1 Section C1: Changes to residents' health status

According to previous research, between 19% and 42% of all medication administered was linked to medication errors (Desai, Williams, Greene *et al*., 2013:403–408). To be able to determine if residents received a reasonable standard of care in terms of medication administration, the analysed data will be discussed in terms of the type of errors encountered in the selected facilities where the study participants were employed.

5.2.1.1.1 Variable 15: Errors encountered in facilities

Although medication errors occurred in each of the phases of medication management, most occurred in the medication administration phase. Though they were the most serious, they were also the most preventable (Ferrah *et al.*, 2017:433–442). Carayon *et al.* (2014:56–65) cited that one medication error such as the late dispensing of medication subsequently often led to a second medication error, for example, late administration of medication, which could change the residents' health status. In this research study, results showed in Chapter Four (4), Table 4.55 that the study participants had seen multiple medication errors in their facilities, of which missing medication altogether was the most predominant medication error, n=79 (64.8%). Another common medication error was the administering of medications to residents after discontinuation of the medications, n=34 (27.9%). These omissions of doses as well as overdosing, such as continuing administration after discontinuation, were closely linked to the administration of wrong dosages, as observed by n=22 (18.0%) of the study participants as displayed in Chapter Four (4), Table 4.55. Literature indicated that wrong dose administrations were the most frequent of all medication errors. It could cause harm to residents, especially when a wrong dose of antipsychotics, sedatives, anticoagulants, and antidiabetic medications are administered (Desai *et al.*, 2013:403–408; Ferrah *et al.*, 2017:433–442).

Slightly less frequent was the observation of medication administered at the wrong times, as reported by n=62 (50.8%) of study participants (Chapter 4, Table 4.55). According to the Pearson Chi-square test, with a p-value of p = <.001, there appeared to be a statistically significant correlation between medication given at the wrong time and interruptions during the rounds from other staff and residents as displayed in Chapter Four (4), Table 4.55 and Figure 4.16. In contrast, when examining the correlation between medication given at the wrong time and the confidence participants had in the ability of their drug administration systems to ensure that residents received medication at correct times, the Spearman's rank-order correlation test indicated no significant correlation between the two variables, p = .086 (Chapter 4, Tables 4.55 and 4.56).

Furthermore, a total of n=19 (15.6%) participants observed medication given to the wrong resident as seen in Chapter Four (4), Table 4.55. Ferrah *et al.* (2017:433–442) reported that the relative risk (RR) for administering medications to the wrong residents was 4.4, 95% CI = 3.70–5.20. The last medication error observed by study participants was also the least frequently observed, namely the administration of wrong medication, n=16 (13.1%) as shown in Chapter Four (4), Table 4.55. A systematic review found that between 0.6% and 40% of all medication errors were deemed to be mild to severe. However, administering the wrong medication as well as administering medication to the wrong resident, if the residents were between 70 and 90 years old, could be fatal in 9% to 15% of all cases (Ferrah *et al.*, 2017:433–442).

The discussion of the results in section C1, indicated that the study participants had seen various medication errors in their facilities such as omission of doses and overdosing, administering wrong dosages, administering medications at the wrong times, as well as administering medications to the wrong residents. All these medication errors could result in changes to residents' health status, such as harm or death.

5.2.4.2 Section C2: Implications of medication errors for facilities

Medication errors can not only cause harm and death to residents but have widespread implications for facilities in terms of negligence claims and the accompanying litigation costs. In 2017, the projected cost was approximately forty billion rand against the Department of Health for contingent liabilities for medical malpractice (South African Law Reform Commission, 2017). Also, were a 132% increase in lawsuits involving malpractice and negligence claims against all categories of health care providers in South Africa (Medical Protection Society, 2020). Moreover, the severity of the implications of medication errors for facilities are reflected in the SANC statistics indicating a total of 1043 professional misconduct cases against nurses between 2003 and 2016, some including medication errors (SANC, 2019). The subsequent discussion of the results associated with implications for facilities comprised of three variables: confidence in the safety of medication administration systems; medication accountability; and resource related medication errors.

5.2.4.2.1 Variable 16: Confidence in the safety of medication administration systems

According to the "five rights" of medication administration, medication must be administered on time (Grissinger, 2010:542) as seen in Chapter Two (2), Section 2.5.2. In this research study, the study participants were asked to self-report on how convinced they were that their medication administration systems were safe i.e., how confident they were that their residents received

medication at the correct times. Also, medication rounds could be lengthy and could take 2.5-4.5 hours per day (Qian *et al.*, 2015:427–434; Szczepura *et al.*, 2011:1–10). Hence, the study participants were asked how convinced or confident they were that the length of their medication rounds were time efficient. Lastly, when administering certain medications in South Africa such as schedule 5 and 6, a registered nurse must administer these medications in the presence of a witness (SANC, 1984). Therefore, study participants were asked whether their medication administration systems were the best given the number of staff they had available to administer medication.

With data analyses, it was comforting to note that participants had reasonable confidence in their medication administration systems and that none of the participants reported no confidence in their medication administration systems. In terms of participants' confidence levels in their medication administration systems allowing their residents to receive their medication timeously, n=62 (50.4%) felt very confident, and a further n=58 (47.2%) felt fairly confident as shown in Chapter Four (4), Table 4.56. The Pearson's Chi-square test showed no correlation between the study participants' confidence levels and the fact that n=62 (50.8%) reported they had seen medication given at the wrong time, p = .696 as seen in Chapter Four (4), Tables 4.55 and 4.56. Also, n=64 (52.0%) of participants were very confident, and n=55 (44.7%) felt fairly confident that their medication administration systems were time-efficient concerning the duration of medication rounds as displayed in Chapter Four (4), Table 4.57. Again, the Pearson's Chi-square test showed no correlation between the study participants' confidence levels and interruptions to the round from other staff and residents (p = .169), as well as being under pressure to complete drug rounds in a certain amount of time (p = .580) as seen in Chapter Four (4), Table 4.57 and Figure 4.16.

Whether participants felt confident that their medication administration systems were safe in terms of the number of staff available to dispense medicines, n=53 (43.1%) indicated they were very confident and n=63 (51.2%) fairly confident as seen in Chapter Four (4), Table 4.58. Further statistical analysis using the Pearson Correlation test indicated a statistically significant difference (p = .016), where participants with more than three years of work experience in residential facilities for older persons were more likely to believe that their current medication administration systems were safe given the number of staff available to administer medication as shown in Chapter Four (4), Tables 4.4 and 4.58. According to McLeod *et al.* (2015:1–20), it was unlikely for nurses to report on the positive aspects of their medication administration procedures and accompanying safety aspects, as they would rather highlight the gaps for improvement (McLeod, Barber & Franklin, 2015:1–20).

5.2.4.2.2 Variable 17: Medication accountability

According to the Code of Ethics for Nursing Practitioners in South Africa, nurses are accountable for all their actions and omissions in the course of performing their duties, and must therefore take responsibility for all actions (SANC, 2013). Thus, ENAs who perform tasks such as medication administration out of their scope of practice are accountable for their actions and also any omissions related to medication administration. In this instance, the principle of vicarious liability may apply. Vicarious liability refers to the unlawful conduct by a first-person, but a second person is also liable for the first person's actions. The second person is usually the employer, who can be held liable according to common law for the conduct of the employee's actions (Dhai & McQuoid-Mason, 2011:94).

Medication accountability as perceived by the study participants was thus important in identifying what they saw as the most common errors of medication accountability in their facilities. As seen in the discussion of variable 11: recordkeeping (Section 5.2.3.2.2), incomplete records or the lack thereof, was one of the most common factors which contributed to medication errors (Andersson *et al.*, 2018:354–362). From the results, it was evident that study participants perceived *not signing for medication administered* as the most common error of medication accountability n=70 (56.9%) as displayed in Chapter 4, Table 4.59. Scoring almost similar was *not recording reasons for non-administration* n=69 (56.1%) also displayed in Chapter Four (4), Table 4.59. When using the Pearson's Chi-square test to explore the correlation between participants stating that they perceived an error of medication accountability as to when *reasons for non-administration* were not provided (Chapter 4, Table 4.59) and the reasons, therefore (Chapter 4, Figure 4.13), there was no statistically significant correlation between the reasons of *"time pressure"* (p = .094) and *"not enough space on MAR charts"* (p = .052). However, this test did indicate a statistically significant correlation between not providing a reason when medication is not administered, and that *"people forget"* (p = .041).

The study participants reported that *not recording times for "pro re nata"* (PRN) medications was a medication error they noted n=58 (47.2%) as seen in Chapter Four (4), Table 4.59. Likewise, *not having a witness* available to sign MAR changes n=43 (35.0%) and that nurses did *not record the actual amounts* of medication administered n=34 (27.6%) were perceived as common errors of medication accountability (Chapter 4, Table 4.59). To a lesser degree, the study participants, n=14 (11.4%), perceived nurses *not booking in stock* they received as medication accountability errors (Chapter 4, Table 4.59).

Ferrah *et al.* (2017:433–442) described this failure of staff to document their actions performed during medication administration as the underlying cause of medication errors. Furthermore, in a court case in 2012, *March v Arnot*, a registered nurse administered the wrong medication and although she rectified her mistake, the recordkeeping was only entered into the documentation four months after the resident died. This led to punitive damages for the facility, as they did not address medication errors at their quality assurance meetings, neither did the facility ensure that the nurse received the necessary training (March v Arnot Ogden Med. Ctr., 2012). Likewise, the scores from both the RNs, ENs, and ENAs, for the most common errors of medication accountability suggest behavioural factors and that it would be to managements' advantage to monitor completion of documents more closely. The findings of this study were consistent with the World Health Organization's (WHO) observation in their monograph *Medication Errors: Technical Series on Safer Primary Care*. The WHO stated that inaccurate medication administration records in care homes are an organisational factor contributing to medication errors (WHO, 2016:13).

5.2.4.2.3 Variable 18: Resource-related medication errors

The results of this study showed that all three categories of nurses, namely RNs, n=42 (70.0%), ENs, n=26 (74.3%), and ENAs, n=25 (89.3%) perceived *75.6%* during medication rounds as the most common reason for medication errors (Chapter 4, Figure 4.16). Study participants' perceptions appeared to mirror a challenge experienced globally by nurses, which has been widely reported by multiple authors as a potential cause of medication errors (Al-Jumaili & Doucette, 2017:470–488, 2018:470–488; Dilles *et al.*, 2011:171–180; Ellis *et al.*, 2012:128–149; Ferrah *et al.*, 2017:433–442; Metsälä & Vaherkoski, 2014:12–28; Odberg, Hansen, Aase *et al*., 2019:1113–1124; Qian *et al.*, 2015:427–435). Odberg *et al.* (2018:1113–1124) described this phenomenon in more detail by categorising it as either passive, e.g., background noises and bells ringing, or active, such as discussions with residents and colleagues or answering phones. Moreover, the authors commented on the danger of staff getting desensitised by interruptions during medication rounds to the extent of accepting this as normal circumstances (Odberg *et al.*, 2019:1113–1124). McLeod *et al.* (2015:1–20) reported that according to their study results, the most interruptions were firstly caused by other nurses, secondly by the patients, and thirdly by the nurse herself/himself. An intriguing way of managing interruptions during medicine rounds was mentioned in a study where nurses in a Finland hospital were required to wear colour-coded vests as well as to place banners with "do not disturb" signs on medication rooms while busy with medication preparations (Metsälä & Vaherkoski, 2014:12–28).

The total score across the three nurse categories showed that study participants perceived *staff being overworked* n=48 (39.0%), and *staff under stress* n=52 (42.3%) as reasons for medication errors (Chapter 4, Figure 4.16). However, in both circumstances, the ENAs n=19 (67.9%) perceived being overworked and under stress as a substantially higher reason for medication errors than the RNs n=16 (26.7%) as seen in Chapter Four (4), Figure 4.16. These findings were in line with the next reason for medication errors, which was *shortage of appropriately qualified staff.* It was discouraging to see that this shortage of appropriately qualified staff as the reason for medication errors was a bigger concern for the ENAs, n=19 (67.9%), and ENs, n=12 (34.3%), than for the RNs n=14 (23.3%) as displayed in Chapter Four (4), Figure 4.16. Aiken *et al.* (2017:559–568) similarly cautioned employers against the substituting of professional nurses with assistant nurses. The authors stated that when substituting only one RN for one ENA per 25 residents, this reduced the skill mix from 66.7% to 50%, and could consequently cause a 21% increase in the probability of mortality.

To *complete a drug round in a certain amount of time* could cause pressure to staff and led to otherwise preventable medication errors. During the literature reviewed in Chapter Two (2), Section 2.4.2, Ellis *et al.* (2012:128–149) reported that nurses tended to take shortcuts such as to pre-pour medication and disguise medicine in juice, to prevent supervisors from filing medication-error reports against them. In this study, the results indicated that more than a third of the participants also experienced this pressure, n=41 (33.3%) as seen in Chapter Four (4), Figure 4.16. When referring to the results displayed in Chapter Four (4), Table 4.15, it showed that the ENAs as a nurse category administered a large portion of medications on night duty, in emergencies and when staff shortages occur. It is therefore not surprising to see that n=12 (42.9%) of the ENAs reported that they felt under pressure to complete drug rounds in a certain amount of time and that this could be a reason for them making medication errors.

Poor and/or insufficient knowledge of the action of medications and their side effects that could cause medication errors seemed to be a concern for n=38 (30.9%) of the study participants as seen in Chapter Four (4), Figure 4.16. Also, n=26 (21.1%) of the study participants noted that a *lack of training* was a common reason for medication errors (Chapter 4, Figure 4.16). Relative to the size of the group, the ENAs, n=9 (32.1%), scored a *lack of training* higher than the ENs, n=10 (28.6%), and RNs n=7 (11.7%) as seen in Chapter Four (4), Figure 4.16. The scope of practice of ENAs in South Africa only includes the provision of elementary nursing care under the supervision of the RN (RSA, 2005:25; SANC 1984:12). It can thus be deduced that the ENAs probably did not receive training on the action of medications and their side effects. There

appeared to be a strong correlation between poor and/or insufficient knowledge of the action and side effects of medications (Chapter 4, Figure 4.16), and when study participants last received medication training as the Spearman's rho test indicated with a p-value of p = .005 (Chapter 4, Table 4.5). This study's results were consistent with results reported by various authors in as much as a lack of knowledge of the action of medications, medication interactions, mathematical skills, and pharmaceutical knowledge, in general, harmed medication errors (Al-Jumaili & Doucette, 2017:470–488; Metsälä & Vaherkoski, 2014:12–28; Szczepura *et al.*, 2011:1–10; Tshiamo *et al.*, 2015:18–23).

The ENA's perception of a *lack of training* appeared to be warranted (Chapter 4, Figure 4.16), seeing that n=13 (46.4%) received their last medication training between one and five years ago (indicated in Chapter 4, Table 4.5). A study in Sweden supported this finding, where the researchers examined 186 Lex Maria reports (mandatory reporting of serious adverse events to the Swedish Health and Social Care Inspectorate) and mentioned that 64 reports had a direct bearing on medication errors. Of these 64 reports, 46 were related to a lack of competence of staff. Especially the administering of insulin was in 15 of the 16 cases due to errors made by assistant nurses (Andersson *et al.*, 2018:354–362). The last reason for medication errors as self-reported by the study participants was due to *confusing drug administration systems that are also open to error*. It was encouraging to note that a low percentage of the study participants, n=9 (7.3%), found this a probable reason that could cause medication errors as seen in Chapter Four (4), Figure 4.16.

From the discussion of Section C2 (5.2.4.2): Implications of medication errors for facilities, it was comforting to see that study participants showed reasonable confidence in their medication administration systems (Variable 16, section 5.2.4.2.1). However, as the results indicated poor recordkeeping in Variable 17, section 5.2.4.2.2, the failure to document actions could imply a neglect of nurses' medication accountability as described in the Code of Ethics for Nursing Practitioners in South Africa (SANC, 2013). The most predominant resource related medication errors referred to frequent interruptions, staff being overworked or under stress, shortages of appropriately qualified staff, pressure to complete drug rounds on time and poor and/or insufficient knowledge (Variable 18, section 5.2.4.2.3). All these factors described above as part of Component No 3: Outcome Measures provided evidence of various factors associated with medication errors within the specified residential facilities for older persons in the Metro-North, WCP. With the discussion of these factors, research objective *RO.4* (Section 5.2.4) was met, namely to: Provide evidence of factors associated with medication errors in the elderly within the

specified residential facilities for older persons in the Metro-North, WCP, as provided by the nurses.

5.3 LIMITATIONS OF THE STUDY

Firstly, although a large body of knowledge and literature exists relating to medication administration, there was a lack of published studies in South Africa focusing on this topic in residential facilities for older persons. Therefore, the setting of this study may differ in terms of the characteristics such as nursing homes, acute care facilities and skilled care facilities in developed countries. However, the attempt to include high-quality studies resulted in the exclusion of grey literature such as masters' theses by the researcher. Thus, there could be relevant studies excluded, especially those about residential facilities for older persons in the WCP, South Africa.

This study was also limited to a stratified sample of 10 funded and 18 private residential facilities for older persons in the Metro-North, WCP, South Africa. By using only this setting, the findings may not be generalizable to other settings. An additional limitation was the relatively small sample size. The unforeseen COVID-19 pandemic resulted in severe staff shortages, high absenteeism, and the use of agency staff in the selected residential facilities for older persons. Agency staff were not included in the study due to the predetermined exclusion criteria. Subsequently, the sample size of N=123 (60.6%) was smaller than anticipated.

Although the researcher used a validated questionnaire, the research study still relied on the self-reporting of nurses as to what they perceived as factors associated with safe medication administration in their facilities. Unfortunately, the data collection process was severely strained by the COVID-19 pandemic due to the total lockdown from 15 March 2020 to 11 September 2020 of all residential facilities for older persons in South Africa (Department of Co-operative Governance and Traditional Affairs, 2020a; Department of Social Development, 2020b). With no access allowed for data collection, it required an amendment to the study protocol and further approval from the Health Research Ethics Committee (HREC) of Stellenbosch University to include online questionnaires. However, a reported lack of resources left some study participants unable to complete online questionnaires. With the limited lifting of the disaster management levels, the researcher could gain access to limited facilities from 23 June 2020 due to her work situation and provided paper-based questionnaires on request from study participants. The above led to the limitation of exceeding the data collection timeframe, renewal of an expired SPSS

software package licence due to the extended timeframe and exceeding the proposed study timeframe.

Lastly, the study focused only on factors associated with safe medication administration, and not on medication errors per se. Prior knowledge of the lack of formal reporting systems in the facilities persuaded the researcher to exclude formal incident reports from the study to facilitate truthful reporting.

5.4 CONCLUSIONS

The research question guiding this study was: What are the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province? To determine what these factors were, specific objectives were formulated and then discussed in alignment with literature based on previous research and the Donabedian's Structure-Process-Outcome Quality of Care Model as a conceptual framework (Donabedian, 2005:691-729). The study findings indicated that the four objectives were met.

First, the study findings revealed that the socio-biographical data related to nurses indicated a homogenous, more mature group, who were experienced in residential care for older persons. Nurses with a degree-level education were scant, with a limited number of nurses utilising opportunities for further professional development. Two key findings in this section were that provision of on-site medication training was ad hoc, and inadequate to provide nurses with up to date knowledge. A second key finding was the unusual high job pressures that the nurses experienced due to increased workloads, dealing with problem residents, paperwork, and dealing with conflict within the facilities. As this research study included the ENAs who also administered medication, it provided a more comprehensive image of factors associated with safe medication administration in the specified residential facilities for older persons within the Metro-North, WCP.

Second, the investigation of organisational resources and infrastructures disclosed that medication storage systems provided difficulties for almost half of the study participants. They found the systems bulky, with the medication frequently stored incorrectly or in wrong sections. The findings showed that MAR chart folders were perceived as more user friendly, presenting little difficulties to the users.

Third, with the identification of the medication administration processes followed or applied by the nurses, study findings highlighted several weaknesses in the processes followed. A key finding that needs to be addressed was the neglect to perform thorough checks in terms of the "five

rights" of medication administration in favour of administering medications based on assumptions that it would be correct. Another main conclusion was the magnitude of poor recordkeeping, as perceived by the study participants. Also, the lack of computer skills could present challenges in terms of the implementation of technology in detecting medication errors as well as the implementation of electronic medication management systems.

Lastly, evidence was provided of factors associated with medication errors. It was encouraging to see that the study participants showed reasonable confidence in the safety of their medication administration systems. Also, several resource-related errors as perceived by the study participants were consistent with the searched literature, such as frequent interruptions during rounds. In contrast, medication accountability presented challenges to at least half of the participants, including not signing for medications neither providing reasons for not administering. These factors associated with medication errors need to be addressed and prioritised to reduce the risk to both residents, nurses, and the facilities.

The acquisition of knowledge regarding the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, WCP, can be used for developing risk management strategies in the mentioned facilities to improve resident outcomes.

5.5 RECOMMENDATIONS

Grove and Gray (2019:328) described recommendations in research as the attempt for a researcher to design a better study for the future by making suggestions for implementation for further research. The overall aim should be to contribute to the body of knowledge needed to improve evidence-based practice. The recommendations for this study were consequently done according to the underlying conceptual framework, namely Donabedian's Structure-Process-Outcome Quality of Care Model (Donabedian, 2005:691–729). When linking the structures, processes, and outcomes within this study with the model, it provided an all-inclusive view to explain the interchange between associated factors and safe medication administration in residential facilities for older persons.

5.5.1 Recommendations to improve structural measures

Although legislation is available to guide facilities and nurses in the residential facilities for older persons, diverging from the theory to the practical reality appears challenging. Compliance with the staffing model as prescribed in the Older Persons Act 13 of 2006 is not only legally binding

but sustainability is imperative to increase and strengthen nurse resources (RSA, 2006). The enforcement thereof should be prioritised by the stakeholders and management of the residential facilities for older persons.

Twice a year, the National Department of Health prescribes in-service training sessions on medication management to all their health professionals (Department of Health, 2011a:12). In this study, n=19 (15.4%) of participants indicated that they received medication training in the last 6 months and n=24 (19.5%) received training in the last year (Chapter 4, Table 4.5). It would be to managements' advantage to monitor compliance to training and include the mandatory training in their annual training program, which should include basic principles such as the "five rights" of medication administration as well as what construed as medication errors. Also, a higher focus on medication training during workshops would be to the advantage of both nurses, facilities, and residents. Topics such as polypharmacy, specific classes of medications closely associated with increased medication errors such as antipsychotics, sedatives, anticoagulants, and antidiabetic medications must be included. This would be in line with the directive of the WHO Global Patient Safety Challenge of 2017, titled "Medication Without Harm" (WHO, 2019a). The goal is to decrease medication-related harm worldwide by 50% over the next five years. As part of the initiative, the WHO highlights three key areas, namely medication safety in polypharmacy, high-risk situations, and transitions of care. Within this, the focus is on the prescribing, dispensing, administering, and monitoring of medication, and improvements in each phase (WHO, 2019a). Also, when analysing the training needs of staff, nurses must be encouraged and assisted by employers to undertake short courses to enhance their computer skills. As indicated in the results in Chapter Four (4), Tables 4.9 and 4.52, only n=25 (20.3%) of study participants received formal computer training, and n=36 (29.3%) indicated that they are very inexperienced in computer use. According to Topkaya and Kaya (2014:141–149), computer use could improve healthcare practices since it led to improved competencies and decision-making skills. Also, an increasing amount of healthcare facilities implement electronic health records, and a lack of computer experience could be an obstacle in the use (Topkaya & Kaya, 2014:141–149). The upskilling of nurses will enhance the transition from paper-based medication systems to electronic systems.

This research study highlighted additional constraints in terms of organisational resources, such as bulky medication storage systems. In total, n=62 (50.4%) of participants found the system bulky (Chapter 4, Figure 4.3). Interprofessional collaboration is advised to explore alternatives and find practical solutions, such as replacing heavy inadequate medication trolleys with wall-mounted steel medication cupboards in residents' rooms.

Furthermore, it is recommended to use workload indicators to examine the sources of high job pressure stated by the study participants. A study in Canada confirmed extreme workload and time constraints as the biggest challenges that influence all the stages of the medication process (Ellis *et al.*, 2012:128–149). As showed in Chapter Four (4), Table 4.10, participants indicated increased workloads, n=93 (75.6%), dealing with problem residents, n=82 (66.7%), paperwork, n=81 (65.9%), and dealing with conflict within the facilities, n=83 (67.5%), as sources of high job pressure. Again, interprofessional collaboration is advised, to establish the need for counselling and support services to staff as well as ways to improve work environments. The utilisation of experienced and qualified nurses' post-retirement to fill the gap in the nursing shortages could provide relief to facilities and should be explored. Authors also identified the trend of utilizing experienced and qualified nurses post-retirement to fill the gap in the nursing shortages in both South Africa and Thailand (Kaewpan & Peltzer, 2019:217; Spiva, Hart & McVay, 2011:1–10; Uthaman *et al.*, 2016:50–55). Older nurses have a higher risk for developing severe illness due to COVID-19 (Centres for Disease Control and Prevention, 2021). Risk-management strategies must therefore include training to these older nurses to reduce the risk of spreading of COVID-19 infections.

Lastly, there is a need to grasp the complexity of the medication administration process and a realisation that sophisticated cognitive skills are needed to provide oversight of this process and coordinate efforts. The current Regulations Relating to the Scope of Practice of Persons Who are Registered or Enrolled under the Nursing Act, 1978 as amended is dated 1984 (SANC, 1984). Although attempts were made to amend these regulations, and revision appears to still be in progress, it will be in the best interest of nurses when policy developers examine and clarify the role of the EN and ENA in medication administration. This can open dialogue for ways to integrate theory into practical realities.

5.5.2 Recommendations to improve process measures

Improved structural measures, as described in Section 5.5.1, can lead to improved process measures. Facilities need to adopt a multifaceted approach to address constraints and inadequate workflow processes. A comprehensive teamwork approach using staffs' organisational skills can assist in simplifying time-consuming stock control systems.

The South African National Department of Health (2011) prescribes core standards for health establishments in South Africa, to set the standard for the monitoring of quality care against

service delivery. Applicable to this study would be the standards to ensure quality nursing and clinical care to reduce unintended harm to residents, including risk management and management of medico-legal incidents (Department of Health, 2011a). Improved monitoring of the execution of medication administration is thus needed to improve compliance with the following of correct procedures. Unnecessary safety risks such as nurses making assumptions about the accuracy of medication, and therefore not performing thorough checks, must be addressed. The high incidence reflected in the results of nurses not recording tasks related to medication administration due to "people forget" should be explored, monitored, and addressed by supervisors. It is therefore recommended to include medication management in facilities' quality management programs. The Western Cape Department of Social Development prescribes in the Health Norms and Standards that all residential facilities for older persons must have a quality management program in place. Work procedures must be described and monitoring tools used such as internal audit documents. Health indicators such as medication errors must be monitored, with the implementation of improvement programs (Department of Social Development, 2015:13).

Cautious revision and updating of medication policies are advised to ensure a transition from mere mandatory artefacts to practical everyday resources for nurses. The Western Cape Department of Social Development states in the Health Norms and Standards that all residential facilities for older persons must review and update all health policies every two years (Department of Social Development, 2015:13). Medication policies must also be aligned with the scope of practice of all categories of nurses, especially the responsibilities of the ENAs. The storage policies in RNs offices may limit access especially after hours and should be addressed. Health policies must be stored at the nurses' stations, to allow for easy reference (Department of Social Development, 2015:13). Mandatory reading of medication policies should be recorded. Also, as almost 70% of nurses were allowed to use their mobile phones for work purposes, clear guidelines must be available to provide a balance between professional boundaries, protection of confidentiality of residents, and the use of mobile phones as a tool in medication administration.

5.5.3 Recommendations to improve outcome measures

Managers should capitalise on the positive study results showing the confidence that study participants had in the safety of their medication systems as well as their perceptions that these systems were not open to error. This can be conducive to a more proactive, developmental, and problem-solving approach that would be to the advantage of all stakeholders, including nurses,

management, and residents. However, the study results showed that medication errors were evident in the facilities and reflected poor accountability in terms of medication administration. Medication errors such as missing medications altogether, as indicated by n=79 (64.8%) in Chapter Four (4), Table 4.55, and not recording reasons for non-administration, n=69 (56.1%), as displayed in Chapter Four (4), Table 4.59, are preventable and should be incorporated in training sessions.

Lastly, it is recommended that facilities develop and implement risk management strategies to encourage medication error reporting. The SANC (SANC 1984:10,12) states that ENs must practice basic nursing and ENAs must provide elementary nursing care under the supervision of a RN and according to his/her scope of practice. Therefore, all risk management strategies should be aligned with this description as stated by SANC. Formal medication error reporting systems with medication review committees to audit these results is advised. A mandatory coordinated error reporting system on the provincial and national level with be beneficial to all residential facilities for older persons. The WHO's publication on the role of pharmacovigilance centres discuss in broad the prevention strategies needed for medication errors, such as proactive assessments of possible preventions of adverse drug reactions, incident reporting systems, and analyses of reports (WHO, 2014). On a local level, the WHO advises the use of the incident reports, resident chart reviews, direct observation, and the use of adverse event trigger tools. On a national level, the formation of patient safety organizations is advised, to analyse medication error reports and perform root cause analysis, with implementation of preventative strategies (WHO, 2014). Results suggest that implementation of the recommendations for the abovementioned structural measures will have an impact on medication administration processes. Improved medication administration processes will be evident in the care of residents as reflected in their health status and a reduction in medication errors.

5.5.4 Future research

The limited available research studies regarding medication safety and specifically medication errors in residential facilities for older persons in South Africa provide vast opportunities for future research. Medication administration workflow processes in residential facilities should be investigated as the less clinical environment differs vastly from those of hospitals. Also, future research using observational studies to complement the data collected on factors associated with medication administration via self-reporting can contribute to the body of knowledge. Due to the lack of formal medication error reporting systems, research including document reviews could

provide valuable insights into the prevalence of medication errors in the residential facilities for older persons. Lastly, an exploration of the sources of job pressure in this setting can provide valuable information to mitigate the stress of nurses working in residential facilities for older persons.

5.6 DISSEMINATION

The researcher intends to submit a report of this study's findings for perusal to the Department of Social Development, Western Cape, who are tasked with the monitoring of compliance with norms and standards as well as the registration of the residential facilities for older persons. Also, the researcher intends to send a copy of the report to the managers of the facilities who participated in the study. Feedback regarding the findings of this study will also be provided to stakeholders and participants who partake in the study by means of meetings, seminars, and conferences. The researcher also proposes to present these study findings at international and national conferences and workshops scheduled for the residential facilities for older persons when the opportunity arises. In addition, the findings of this study will be discussed at management meetings, and at workshops presented by the researcher in the course of her duties as health auditor. The intention is also to publish this research.

5.7 CONCLUSION

The limited published research on medication errors in long-term facilities for older persons, especially in South Africa, attests to the fact that the safety of older persons receives little attention. The current discourse about medication administration safety is largely based on studies done in developed countries, and several in hospital-based settings. Many of these facilities implemented strategies to prevent medication errors with positive results, such as computerised medication management systems, and national and international error reporting systems. However, in the Western Cape Provence, computerised medication management systems are still a new and unused concept. Although it is also expected from residential facilities for older persons to implement medication error reporting systems internally, in practice there is still very poor compliance. This study highlights the various factors associated with safe medication administration processes as perceived by nurses in the selected residential facilities for older persons. As seen in this study's results, avoiding medication errors among older persons by following appropriate medication administration processes can prevent ill health and death. For this reason, this study has the potential to encourage dialogue regarding new innovative

practices and research towards safer medication administration systems in residential facilities for older persons.

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APPENDICES

Appendix 1: Ethical approval from Stellenbosch University

Approval Notice

New Application

17/02/2020

Project ID:13001

HREC Reference No: S19/10/252

Project Title: Factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province.

Dear Ms. Emerentia Nicholson

The **Response to Modifications** received on 05/02/2020 15:04 was reviewed by members of Health Research Ethics Committee via expedited review procedures on 17/02/2020 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Date: 17 February 2020

Protocol Expiry Date: 16 February 2021

Please remember to use your Project ID 13001 and Ethics Reference Number S19/10/252 on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct Link and the application should be submitted to the HREC before the year has expired. Please see *Forms and Instructions* on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: https://www.westerncape.gov.za/general-publication/health-research-approval-process.
Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: Forms and Instructions on our HREC website https://applyethics.sun.ac.za/ProjectView/Index/13001

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Mrs. Ashleen Fortuin

Health Research Ethics Committee 1 (HREC1)

Appendix 2: Ethical approval from Stellenbosch University: Amendment

Approval Letter

Amendment

10/06/2020

Project ID: 13001

Ethics Reference No: S19/10/252

Project Title: Factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province.

Dear Mrs Emerentia Snyman

We refer to your amendment request received 20/05/2020.

The Health Research Ethics Committee (HREC) reviewed and approved the amendment and the following amended documentation through an expedited review process:

1. Protocol dated 20 May 2020

Where to submit any documentation

Kindly note that the HREC uses an electronic ethics review management system, Infonetica, to manage ethics applications and ethics review process. To

submit any documentation to HREC, please click on the following link: https://applyethics.sun.ac.za

Please remember to use your project ID 13001 and ethics reference number S19/10/252 on any documents or correspondence with the HREC concerning your research protocol.

Yours sincerely,

Mrs. Melody Shana

Coordinator: Health Research Ethics Committee 1

Appendix 3: Permission from residential facilities for older persons

From: DSD REC Ethics <DSD.REC-Ethics@westerncape.gov.za>

Sent: 25 February 2020 14:25

To: Nicholson, EC, Me [20068948@sun.ac.za]

Cc: Petro Brink

Subject: Application for submission to research health committee

CAUTION: This email originated from outside of the University. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good Afternoon miss Nicholson

I hope this email finds you well.

Following a preliminary review of your request, it was found that your request falls outside of the scope of the DSD REC. You are advised to contact each individual facility independently. Should you wish further information you may contact myself or miss Brink.

Kind Regards

Clinton Daniels
Directorate: Research, Population & Knowledge Management
Department of Social Development
Western Cape Government
Private Bag X9112, Cape Town, 8000
1st Floor, 15c Dorp Street, Cape Town
Office: +27 21 483-8658
E-mail: Clinton.Daniels@westerncape.gov.za
Website: www.westerncape.gov.za

From: emerentia65@gmail.com <emerentia65@gmail.com>
Sent: 23 February 2020 12:48
To: 'amandaloc@mweb.co.za' <[redacted]@mweb.co.za>
Subject: Permission to collect data for research study

Dear Ms. [redacted]

I am currently busy with my master's degree in Nursing at the Department of Nursing and Midwifery, at the University of Stellenbosch. Herewith I ask permission to collect data at [redacted] for my research. The title of the study is:

"Factors associated with safe medication administration in specified residential facilities for older persons within the Metro North, Western Cape Province."

The Health Research Ethics Committee at Stellenbosch University granted ethics approval for this study. The reference number is S19/10/252, letter of approval attached, and my supervisor is Ms. Anneleen Damons (021-9389472). Attached also is a synopsis of the research proposal for your convenience, the full proposal has been submitted to the Department of Social Development as well.

Data collection will be by means of a questionnaire, and this will be from your registered nurses, enrolled nurses, and enrolled nurse assistants. The researcher will explain the procedure to the nursing staff, obtain their written consent, and participation will be voluntary. All information will be kept confidential. It should have minimal impact on your service delivery, as it will only take a few minutes to explain the process, and staff can complete the questionnaire in their off-duty times. Attached also find the preliminary questionnaire, this will be adapted for the South African context before data collection.

If you grant permission, I will schedule an appointment with you ahead of time.

Your favourable consideration for participation will be much appreciated.

Student number: 20068948
Kind regards / Vriendelike groete
Emerentia Nicholson

From: [redacted]@absamail.co.za>
Sent: 16 March 2020 13:48
To: emerentia65@gmail.com
Subject: RE: toestemming om navorsing te doen by [redacted]

Goeie dag

Hiermee gee ek, [redacted], Bestuurder van [redacted], toestemming dat Emerentia Nicholson, Studente nr. 20068948, Projek ID :13001; HREC Verwysingnr. S19/10/252 haar studie by [redacted] vir Bejaardes kan doen.

Vriendelike groete

[redacted]
Bestuurder en Direksielid
[redacted]

From: Admin [mailto:admin@[redacted].co.za]
Sent: Tuesday, August 11, 2020 1:44 PM
To: emerentia65@gmail.com
Subject: RE: Permission to collect data for research study

Hi Emerentia
Thank you for email. Could you kindly deliver hard copy if not too much trouble? We need 5 please.
Thank you
Kind Regards
[redacted]
Facility Manager

From: [redacted] <[redacted]@[redacted].com>
Sent: 06 March 2020 09:17
To: emerentia65@gmail.com
Subject: FW: Permission to collect data for research study
Attachments: Letter of approval.pdf; Questionnaire.pdf; Protocol synopsis.pdf
Flag Status: Flagged

Dear Emerentia
You are welcome to do the project. Sorry we did not come back to you sooner, we are busy with Financial year end.
Please let me know when you want to visit,
I just need to inform the staff

Regards
[redacted]
General Manager

From: [redacted] <[redacted]@[redacted].co.za>
Sent: 10 June 2020 15:36
To: emerentia65@gmail.com
Subject: RE: Permission to collect data for research study

Afternoon Emerentia,

I will certainly ask the sisters to complete the questionnaire for you, I will also do one.

Regards
Sr. [redacted]
[redacted] Healthcare Manager

From: Huis [redacted] - Sister <[redacted]@[redacted].co.za>
Sent: 10 June 2020 15:24
To: emerentia65@gmail.com
Subject: RE: Permission to collect data

Good afternoon

You are welcome to send me the link, I will ask the nurses to complete the questionnaire.

Vriendelike groete/Kind Regards,

Sr [redacted]
Hoof van Versorging/ Head of Care

From: [redacted] <[redacted]@gmail.com>
Sent: 09 March 2020 10:17
To: emerentia65@gmail.com
Subject: RE: FW: Permission to collect data for research study
Hallo
There will be 1 Rn and caregivers on duty - woul it be possible to schedule the time for 10h00 instead then sister will be finished with her medication rounds
Regards
[redacted]

From: [redacted]@[redacted]co.za
Sent: 24 February 2020 09:31
To: emerentia65@gmail.com
Cc: [redacted]
Subject: RE: Permission to collect data for research study

Dear Ms Nicholson,
I have read all the documentation you attached to your e-mail.
We are happy to participate in your research project as your findings will add great value to the care of elders in Western Cape.
I await your call to set up an appointment with me.
Kind regards,
[redacted]
General Manager

From: info@[redacted].com
Sent: 23 February 2020 14:44
To: emerentia65@gmail.com
Subject: Re:Permission to collect data for research study

Dear Emmerentia
You are most welcome to collect data at [redacted] for your research.
I look forward to meeting with you.
Kind Regards
[redacted]
Sent from my Huawei phone

From: [redacted] <[redacted]@[redacted].org.za>
Sent: 10 June 2020 16:05
To: emerentia65@gmail.com; [redacted]; [redacted]
Subject: RE: Permission to collect data for research study

Good day
I am happy for you to proceed
Warm Regards
Sr [redacted]
Nursing Service Manager

From: [redacted] [mailto:[redacted]@[redacted].org.za]
Sent: Monday, July 13, 2020 11:20 AM
To: Emerentia Snyman
Subject: RE: Permission to collect data for research study

Good day
Hope this email finds you well.
Iam replying that I did received the email and that I will contact you with the relevant information asap
Kind regards
Sr. [redacted]

From: [redacted] <manager@[redacted]org>
Sent: 19 March 2020 08:18
To: emerentia65@gmail.com
Subject: RE: Request to collect data

Morning
I will be available on 31 March 2020 at 10h00.
Groete / Regards
[redacted]
BESTUURDER / MANAGER

From: [redacted] <[redacted]@gmail.com>
Sent: 13 July 2020 14:55
To: Emerentia Snyman <emerentias@icrasa.com>
Subject: Re: Permission to collect data for research study
Hi Ms Snyman
Sorry, at the moment we only have 2 PN's and 2 EN's. but I have given them your link.
[redacted]

From: [redacted] [mailto[redacted]@[redacted].co.za]
Sent: Friday, July 10, 2020 11:54 AM
To: Emerentia Snyman
Subject: RE: Permission to collect data for research study
Good day,
These are the contact numbers you can send the link to.
[redacted]
Kind regards
[redacted]

From: [redacted] [mailto:huis [redacted]@mweb.co.za]
Sent: Tuesday, July 07, 2020 3:07 PM
To: Emerentia Snyman
Subject: RE: Permission to collect data for research study

Hi there ,
Listed below are the names and telephone numbers for nurses, they don't have access to computers at work.; Sr [redacted]
[redacted]
Kind regards
[redacted]
BESTUURDER

From: [redacted] <[redacted]@gmail.com>
Sent: 09 March 2020 10:17
To: emerentia65@gmail.com
Subject: RE: FW: Permission to collect data for research study
Hallo
There will be 1 Rn and caregivers on duty - woul it be possible to schedule the time for 10h00 instead then sister will be finished with her medication rounds
Regards
[redacted]

From: [redacted] <[redacted]@[redacted].co.za>
Sent: 27 February 2020 09:02
To: [redacted]; emerentia65@gmail.com
Cc: [redacted].com
Subject: RE: Permission to collect data for research study

Dear Emerentia

Shouldn't be a problem please contact Sr [redacted] to make appointment. 021 [redacted]

Kind regards

[redacted]
Nursing Service Manager

From: [redacted] <[redacted]@gmail.com>
Sent: 05 March 2020 10:53
To: emerentia65@gmail.com
Subject: Re: FW: Permission to collect data for research study

Good day Emerentia
You are welcome to come and collect your data here. Please let me know beforehand what day you will be coming.
Kind regards
[redacted]
Nursing Service Manager

From: [redacted] <info@[redacted].co.za>
Sent: 11 June 2020 11:55
To: emerentia65@gmail.com
Subject: RE: Permission to collect data for research study

Good morning

I send information to our head office. Waiting on them, but you can go ahead.

Sorry for any inconvience.

Kind regards,

[redacted]
Manager

From: [redacted] <[redacted]@[redacted]co.za>
Sent: 21 June 2020 13:12
To: Emerentia Snyman
Cc: [redacted]
Subject: RE: Research for nursing staff

Goeie middag Emerentia

Dankie vir jou epos. Die "Corona Ding" het ons almal se planne omver gegooi!!

Ek sal my bes doen om 2 ENA te kry om dit ook vir jou te voltooi.

Groete

[redacted]
Nursing Service Manager

Appendix: 4 Participant information leaflet and declaration of consent by participant and investigator (English)

PARTICIPANT INFORMATION LEAFLET AND INFORMED CONSENT FORM

TITLE OF RESEARCH PROJECT:

Factors associated with safe medication administration in specified residential facilities for older persons within the Western Cape Metropole area.

REFERENCE NUMBER: S19/10/252

RESEARCHER: Mrs. Emerentia C Nicholson (student number: 20068949)

ADDRESS: Department of Nursing and Midwifery, Faculty Medicine and Health Sciences, Francie van Zijl Drive, Tygerberg, 7505.

CONTACT NUMBER: 021-9389823 (US) or 0798544216

SUPERVISOR: Mrs A. Damons

ADDRESS: Department of Nursing and Midwifery, Faculty Medicine and Health Sciences, Francie van Zijl Drive, Tygerberg, 7505

CONTACT NUMBER: 021-9389472 (w)

This is an invitation to participate in a research project titled *"Factors associated with safe medication administration in specified residential facilities for older persons within the Western Cape Metropole area".* This information leaflet explains the details of the research project, and it is important that you are satisfied that you completely understand what the research involves. Participation in this research is entirely voluntary, and participants are free to decline or withdraw at any time during the research with no negative consequences. The Committee for Human Research Ethics Committee at Stellenbosch University approved this study, and the researcher will conduct it according to the ethical guidelines and principles of the International Declaration of Helsinki, the South African Guidelines for Good Clinical Practice, and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

- The aim of this study is to determine the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape area.
- This study will take place in funded and private residential facilities for older persons in the Metro-North, Cape Metropolitan area in the Western Cape Province.
- The researcher will use the data collected from this study to make recommendations for changes in work structures and procedures, to ensure safe medication administration in residential facilities for older persons in the Western Cape.
- Before participation in the research study, you must provide your consent by completing the form below.
- The researcher will ask you to complete a questionnaire for the purpose of this study.

Why are you invited to participate?

As professional registered nurses, enrolled nurses, and enrolled nurse assistants involved in medication processes in residential facilities for older persons, your input is valuable to determine what factors are associated with safe medication administration. By providing your feedback, you will assist in generating knowledge about safe medication administration, to create a safer environment for both residents and nurses.

What will your responsibilities be?

Your responsibilities include completing a consent form, and then a questionnaire which will take about 20 minutes. The type of questions includes your qualifications, experience, training, and employment status. Medication related questions include the policies available to you, and the medication procedure you follow in your facility. There is an opportunity to express your opinion about the current medication systems in your facility, as well as the level of job pressure that you experience. After you complete the questionnaire, you must place it in the envelope provided to you, seal it and mail it in the sealed box in your facility. The researcher or a field worker will collect the questionnaire approximately 4 days thereafter.

Who will benefit from taking part in the research?

Although there are no immediate benefits for participating in this research study, you will contribute to a body of knowledge regarding safe medication administration in residential facilities for older persons. Residents and nurses are likely to benefit from the findings of the research in the future.

Are there risks involved in your participation in this research?

There are no risks involved with this study, however, it can be a minor infringement on you private time as the questionnaire takes about 20 minutes to complete. To ensure confidentiality, the questionnaire and envelope will not have your name on, identification is by a code only and all referral to the data is only by code. People responsible for making sure that the research is done properly, including the supervisor, transcriber, external coder, and members of the Research Ethics Review Committee may review your answer, but they will not be able to connect you to the answers you give, to protect your privacy and ensure anonymity. The researcher will store hard copies of your answers for a period of five years in a locked cabinet in her office and protect electronic information on the computer with a password.

What might happen if you do not agree to participate?

Participation in this study is voluntary and you are under no obligation to consent to participation. You have the right to withdraw from the study at any time without penalty. If you do decide to take part, you give your consent by signing the declaration at the bottom of this document.

Will you be paid to take part and are there any costs involved?

You will not receive payment to take part in this study, and there will also be no costs to you should you agree to participate.

Is there anything else you should know?

If there are any details not covered in this information leaflet and you require any further information or encounter any problems, you can contact Ms. E.C. Nicholson on 0798544216.

Thank you for taking time to read this information sheet and for participating in this study. Feel free to contact me or my supervisor at the above-mentioned number in case of uncertainty.

DECLARTION BY PARTICIPANT (CONSENT TO PARTICIPATE IN THIS STUDY)

I declare that:

- I have read, or had explained to me, this information leaflet and consent form.
- I fully understood the contents of this document.
- I understand the purpose of this research project.

- I had enough opportunity to ask questions and those questions answered to my satisfaction.
- I understand that my participation is voluntary.
- I am aware that I am free to withdraw from the study at any time without any penalty, judgment, or blame.
- I am aware that a research report will contain the findings of this study, without violating my right to confidentiality.
- I agree to complete the questionnaire handed to me.

Signed at: _____ (place) Date: _____

_____

Signature of participant

DECLARATION BY RESEARCHER

I declare that:

- I have fully explained the purpose of the research study to this participant.
- I have encouraged the participant to ask questions and taken the time to answer them.
- I am satisfied that he / she adequately understands all the aspects of the research as set out in this document.
- I did / did not use and interpreter.

Signed at: _____ (place) Date: _____

_____

Signature of researcher

DECLARATION BY INTERPRETER

I declare that:

- I have conveyed all the facts as laid out in this document.
- All questions were answered in isiXhosa
- I am satisfied that the participant fully understands the content of this informed consent document and has had all questions answered satisfactorily.

Signed at: _____ (place) Date: _____

_____

Signature of interpreter

Appendix 5: Participant information leaflet and declaration of consent by participant and investigator (Afrikaans)

INLIGTINGSBLAD VIR DEELNEMERS EN VORM VIR INGELIGTE TOESTEMMING

TITEL VAN DIE NAVORSINGSPROJEK:

Faktore geassosieer met veilige medikasietoediening in spesifieke residensiëleversorgingsoorde vir ouer mense in die Wes-Kaapse metropolitaanse gebied.

VERWYSINGSNOMMER: S19/10/252

NAVORSER: Mev Emerentia C Nicholson (studentenommer: 20068949)

ADRES: Departement Verpleeg- en Verloskunde, Fakulteit Geneeskunde en Gesondheidswetenskappe, Francie van Zijl-rylaan, Tygerberg 7505

KONTAKNOMMER: 021 938 9823 (US) of 079 854 4216

STUDIELEIER: Mev A Damons

ADRES: Departement Verpleeg- en Verloskunde, Fakulteit Geneeskunde en Gesondheidswetenskappe, Francie van Zijl-rylaan, Tygerberg 7505

KONTAKNOMMER: 021 938 9472 (w)

Hierdie dokument is ’n uitnodiging om deel te neem aan ’n navorsingsprojek met die titel *“Faktore geassosieer met veilige medikasietoediening in spesifieke residensiëleversorgingsoorde vir ouer mense in die Wes-Kaapse metropolitaanse gebied”.* Dié inligtingsblad sit die navorsingsprojek se besonderhede uiteen en dis belangrik dat u seker voel dat u ten volle verstaan wat die navorsing behels. Deelname aan hierdie navorsing is geheel en al vrywillig, en deelnemers kan weier of te eniger tyd onttrek sonder enige negatiewe gevolge. Hierdie studie is goedgekeur deur die Gesondheidsnavorsingsetiekkomitee van die Universiteit Stellenbosch, en sal uitgevoer word volgens die etiese riglyne en beginsels van die Internasionale Verklaring van Helsinki, die Suid-Afrikaanse riglyne vir goeie kliniese praktyk, en die Mediese Navorsingsraad (MNR) se etiese riglyne vir navorsing.

Waaroor gaan hierdie navorsingsprojek?

- Die studie se doel is om vas te stel watter faktore met die veilige toediening van medikasie geassosieer word in spesifieke residensiëleversorgingsoorde vir ouer mense in Metro-Noord, deel van die Kaapse metropolitaanse gebied in die Wes-Kaap.
- Die studie sal uitgevoer word in befondsde en privaat residensiëleversorgingsoorde vir ouer mense in Metro-Noord (Kaapse Metropolitaanse, Wes-Kaap).
- Die navorser sal die data wat deur hierdie studie ingewin word gebruik om aanbevelings te maak oor veranderinge in werkstrukture en -prosedures sodat medikasie veilig toegedien kan word in residensiëleversorgingsoorde vir ouer mense in die Wes-Kaap.
- Voor u aan die navorsingstudie kan deelneem, moet u toestemming gee deur die vorm hier onder te voltooi.
- Vir die doeleindes van hierdie studie sal die navorser u vra om ’n vraelys in te vul.

Hoekom nooi ek u om deel te neem?

As professioneel-geregistreerde verpleegkundiges, ingeskrewe verpleegkundiges en ingeskrewe verpleegassistente wat in residensiëleversorgingsoorde vir ouer mense by die medikasieproses betrokke is, is u insette waardevol om te help vasstel watter faktore geassosieer word met die veilige toediening van medikasie. Deur u terugvoer te gee, sal u help om kennis te genereer oor die veilige toediening van medikasie en sodoende ’n veiliger omgewing vir sowel inwoners as verpleegkundiges help skep.

Wat sal ek van u verwag?

U verantwoordelikhede sluit in die voltooiing van ’n toestemmingsvorm en daarna ’n vraelys wat ongeveer 20 minute sal neem om te voltooi. Die tipe vrae sluit u kwalifikasies, ervaring, opleiding en indiensnemingstatus in. Vrae wat met medikasie verband hou, sluit in die beleid wat u tot u beskikking het en die medikasieprosedure wat u in u versorgingsoord volg. Daar is geleentheid vir u om u mening te gee oor die bestaande medikasiestelsels in u versorgingsoord sowel as die hoeveelheid werksdruk wat u ervaar. Nadat u die vraelys voltooi het, moet u dit in die koevert sit wat ek aan u gegee het, dit verseel en in die verseëlde houer in u versorgingsoord sit. Die navorser of ’n veldwerker sal die vraelys ongeveer vier dae daarna by u versorgingsoord kom haal.

Wie sal voordeel trek uit deelname aan hierdie projek?

Hoewel daar nie onmiddellike voordele daaraan verbonde is om aan hierdie navorsingstudie deel te neem nie, sal u bydra tot kennis oor die veilige toediening van medikasie in

residensiëleversorgingsoorde vir ouer mense. Inwoners en verpleegkundiges sal waarskynlik in die toekoms by hierdie studie se bevindinge baat.

Watter gevare is daar vir u as u aan hierdie navorsingstudie deelneem?

Daar is geen risiko by hierdie studie betrokke nie, maar daar kan ’n bietjie op u privaat tyd inbreuk gemaak word omdat dit ongeveer 20 minute neem om die vraelys te voltooi. Om vertroulikheid te verseker, sal nóg die vraelys, nóg die koevert waarin die vraelys geplaas word u naam op hê. Identifisering sal slegs met behulp van ’n kode geskied en daar sal slegs met daardie kode na die data verwys word. Die mense wat seker maak dat die navorsing behoorlik uitgevoer word, insluitende die studieleier, transkribeerder, eksterne kodeerder en lede van die Gesondheidsnavorsingsetiekkomitee, kan dalk na u antwoorde kyk, maar om u privaatheid te beskerm en u anonimiteit te verseker, sal hulle sal nie in staat wees om ’n verband tussen u en u antwoorde te lê nie. Die navorser sal die papierweergawe van u antwoorde vir vyf jaar in ’n geslote kabinet in haar kantoor bêre en sal die elektroniese inligting op haar rekenaar met ’n wagwoord beveilig.

Wat kan gebeur as u nie instem om deel te neem nie?

Deelname aan hierdie studie is vrywillig en u staan onder geen verpligting om in te stem om deel te neem nie. U het ook die reg om op enige stadium te onttrek, sonder enige benadeling. As u besluit om deel te neem, gee u toestemming deur die verklaring aan die einde van hierdie dokument te teken.

Sal u betaal word om deel te neem, en sal dit u enigiets kos?

U sal nie enige betaling ontvang vir deelname aan hierdie studie nie, en daar sal ook nie enige kostes vir u wees as u sou instem om deel te neem nie.

Is daar enigiets anders wat u moet weet?

As daar enige besonderhede is wat nie deur hierdie inligtingsblad gedek word nie, óf as u enige verdere inligting benodig of enige probleme ervaar, kan u me EC Nicholson op 079 854 4216 kontak.

Dankie dat u die tyd geneem het om hierdie inligtingsblad te lees en aan hierdie studie deel te neem. Kontak my of die studieleier gerus by bogenoemde nommer as u oor enigiets onseker voel.

VERKLARING DEUR DEELNEMER (TOESTEMMING OM AAN HIERDIE STUDIE DEEL TE NEEM)

Ek verklaar soos volg:

- Ek het hierdie inligting-en-toestemmingsvorm gelees, of dit is aan my verduidelik.
- Ek verstaan die inhoud van hierdie dokument ten volle.
- Ek verstaan die doel van hierdie navorsingsprojek.
- Ek het genoeg geleentheid gehad om vrae te stel, en my vrae is bevredigend beantwoord.
- Ek verstaan dat my deelname vrywillig is.
- Ek weet ook dat ek in enige stadium kan ophou deelneem sonder enige benadeling, oordeel of blaam.
- Ek is bewus daarvan dat ’n navorsingsverslag die bevindinge van hierdie studie sal bevat, sonder enige benadeling van my reg tot vertroulikheid.
- Ek stem in om die vraelys wat ek gaan ontvang, te voltooi.

Onderteken: _____ (plek) Datum: _____

_____

Handtekening van deelnemer

VERKLARING DEUR NAVORSER

Ek verklaar soos volg:

- Ek het die doel van die navorsingstudie volledig aan die deelnemer verduidelik.
- Ek het die deelnemer aangemoedig om vrae te vra, en genoeg tyd daaraan afgestaan om dit te beantwoord.
- Ek is tevrede dat hy/sy alle aspekte van hierdie navorsing, soos dit hier bo uiteengesit is, ten volle verstaan.
- Ek het (nie) ’n tolk gebruik (nie).

Onderteken: _____ (plek) Datum: _____

_____

Handtekening van navorser

VERKLARING DEUR TOLK

Ek verklaar soos volg:

- Ek het al die feite soos uiteengesit in hierdie dokument weergegee.
- Alle vrae is in Afrikaans beantwoord.
- Ek is tevrede dat die deelnemer die inhoud van hierdie dokument van ingeligte toestemming ten volle verstaan, en dat al sy of haar vrae bevredigend beantwoord is.

Onderteken: _____ (plek) Datum: _____

_____

Tolk se handtekening

Appendix 6: Participant information leaflet and declaration of consent by participant and investigator (isiXhosa)

INCWADANA YEENKCUKACHA ZOMTHATHI-NXAXHEBA KUNYE NEFOMU YOKUNIKA IMVUME ESEKELWE KULWAZI

ISIHLOKO SEPROJEKTHI YOPHANDO:

Imiba enxulumene nokusetyenziswa kwamayeza onyango ngokukhuselekileyo kumaziko athile aziindawo zokuhlala abantu abadala kummandla weMetropol waseNtshona Koloni.

INOMBOLO YESALATHISO: S19/10/252

UMPHANDI: Nkskz. Emerentia C Nicholson (I: 20068949)

IDILESI: Isebe laBongikazi nokuBelekisa, iZiko leNzululwazi kwezeMpilo naMayeza, Francis van Zijl Drive, Tygerberg, 7505.

INOMBOLO YOQHAGAMSHELWANO: 021 938 9823 (US) okanye 079 854 4216

UMONGAMELI: Nkskz. A. Damons

IDILESI: ISebe laBongikazi nokuBelekisa, iZiko leNzululwazi kwezeMpilo naMayeza, Francis van Zijl Drive, Tygerberg, 7505

INOMBOLO YOQHAGAMSHELWANO: 021 938 9472 (eyomsebenzi)

Esi sisimemo sokuba uthathe inxaxheba kwiprojekthi yophando enesihloko esithi *“imiba enxulumene nokusetyenziswa kwamayeza onyango ngokukhuselekileyo kumaziko athile aziindawo zokuhlala abantu abadala kummandla weMetropol waseNtshona Koloni”.* Le ncwadana yeenkcukacha inika ingcaciso yeprojekthi yophando, kwaye kubalulekile ukuba waneliseke malunga nokuba ukuqonda ngokupheleleyo okuqulathwe kuphando. Ukuthatha inxaxheba kolu phando kukuzithandela ngokupheleleyo, kwaye abathathi-nxaxheba bavumelekile ngokukhululekileyo ukuba barhoxe okanye bangavumu kwaphela nangeliphi na ixesha ngethuba lokwenziwa kophando ngaphandle kweziphumo ezingafanelekanga. Olu phononongo luvunywe yiKomiti yokuZiphatha kuPhando ngaBantu yeYunivesithi yaseStellenbosch, kwaye umphandi uyakuthi alukhokele ngokwezikhokelo ezisesikweni zokuziphatha nemithetho-siseko yeSibhengezo seHlabathi saseHelsinki, iZikhokelo zaseMzantsi Afrika zoKwenziwa kweMisebenzi yeZonyango ngokuFanelekileyo nemiGaqo yokuziPhatha yeBhunga loPhando lwaMayeza kuPhando (iMRC).

Ingaba lumalunga nantoni olu phononongo lophando?

- Injongo yolu phononongo kukuchonga imiba enxulumene nokusetyenziswa kwamayeza ngokukhuselekileyo kumaziko athile aziindawo zokuhlala abantu abadala kwindawo eKumntla weMetro, kummandla waseNtsona Koloni.
- Olu phononongo luyakuthi lwenziwe kumaziko afumene inkxaso yoncedo lwengxowa-mali aziindawo zabantu abadala akuMntla weMetro, ummandla weMetropoliten waseKapa kwiPhondo leNtshona Koloni.
- Umphandi uyakuthi asebenzise iinkcukacha ezigciniweyo eziqokelelwe kolu phononongo ukwenza izindululo zokwenziwa kotshintsho kwisimo somsebenzi kunye neenkqubo, ukuqinisekisa ukusetyenziswa ngokukhuselekileyo kwamayeza onyango kumaziko aziindawo zokuhlala zabantu abadala eNtshona Koloni.
- Ngaphambi kokuthatha inxaxheba kuphononongo lophando, kufuneka unike imvume yakho ngokugcwalisa le fomu ingezantsi.
- Umphandi uza kukucela ukuba ugcwalise iphepha lemibuzo ukulungiselela injongo yolu phononongo.

Kutheni umenyiwe ukuba uthathe inxaxheba?

Njengoonesi abenza umsebenzi wobuchule, oonesi ababhalisiweyo, nabancedisi boonesi ababhalisiweyo ababandakanyeka kwiinkqubo zamayeza onyango kumaziko aziindawo zokuhlala zabantu abadala, izimvo zakho zilixabiso ekwenzeni ingqiqo yokuba yeyiphi na imiba enxulumene nokusetyenziswa kwamayeza onyango ngokukhuselekileyo. Ngokunika izimvo zakho, uyakuthi uncede ekwandiseni ulwazi malunga nokusetyenziswa kwamayeza ngokukhuselekileyo, ukudala isimo sendawo ekhuselekileyo ukulungiselela abemi noonesi.

Luya kuba yintoni uxanduva lwakho?

Uxanduva lwakho luquka ukugcwalisa ifomu yokunika imvume, emveni koko ibeliphepha lemibuzo eliyakuthi lithathe imizuzu engama 20. Uhlobo lwemibuzo luquka iziqinisekiso zakho zemfundo, amava onawo, uqeqesho nesimo somsebenzi owenzayo. Imibuzo enxulumene namayeza onyango iquka imigaqo-nkqubo efumanekayo kuwe, kwananenkqubo oyilandelayo yamayeza kwiziko lakho. Kukho ithuba lokuchaza ngezimvo zakho malunga nenkqubo yamayeza wangoku kwiziko lakho, kwanomgangatho woxinzelelo olufumanayo lomsebenzi wakho owenzayo. Emveni kokugcwalisa iphepha lemibuzo, kufuneka ulifake emvulophini oyinikiweyo, uyivale uze uyithumele ngokuyifaka kwibhokisi evaliweyo kwiziko lakho. Umphandi okanye umsebenzi osebenza kwindawo yasekuhlaleni uyakuthi aqokelele iphepha lemibuzo kwixesha elimalunga neentsuku ezi-4 emveni koko.

Ingaba uya kuzuza ngokuthabatha kwakho inxaxheba kolu phando?

Nangona kungekho zinzuzo zifumaneka kwangoko ngokuthatha inxaxheba kolu phononongo lophando, uyakuthi ubenegalelo kwiqumrhu lolwazi olumalunga nokusetyenziswa kwamayeza onyango ngokukhuselekileyo kumaziko aziindawo zokuhlala zabantu abadala. Abemi kunye noonesi banokuzuza kokufunyanisiweyo kuphando kwixesha elizayo.

Ingaba kukho imingcipheko ebandakanyekayo ekuthatheni kwakho inxaxheba kolu phando?

Akukho mingcipheko ibandakanyekayo kolu phononongo, kananjalo, isenokuba lulwaphulo oluncinane ngamaxesha wakho wezinto zabucala nanjengoku iphepha lemibuzo lithatha malunga nemizuzu engama 20 ukuligcwaliswa. Ukuqinisekisa imfihlelo, iphepha lemibuzo nemvulophu azisayi kubanegama lakho kuzo, ukuchonga kwenziwa ngekhowudi kuphela kwanogqithiselo lweenkcukacha lwenziwa ngekhowudi. Abantu abanoxanduva lokuqinisekisa ukuba uphando lwenziwe ngokufanelekileyo, kuquka umongameli ophetheyo, umkhupheli, umkhowudishi yangaphandle, namalungu eKomiti yoHlolo lokuZiphatha kuPhando asenokuyihlola impendulo yakho, kodwa ayinako ukuqhagamshelana nawe ngeempendulo osinike zona, ukukhusela izinto zakho zabucala nokuqinisekisa ukuba awaziwa. Umphandi uyakuthi agcine iikopi zeempendulo zakho ixesha elingangeminyaka emihlanu kwikhabhathi etshixiweyo eseofisini yakhe kwanokukhusela iinkcukacha ze elektroniki kwikhompyutha enenani lokhuseleko lokuyivula.

Kungenzeka ntoni xa ungavumi ukuthatha inxaxheba?

Ukuthatha inxaxheba kolu phononongo ukwenza ngokuzithandela kwaye akukho sibophelelo uzifaka kuso ngokunika imvume yokuthatha inxaxheba. Unelungelo lokurhoxa kuphononongo nangeliphi na ixesha ngaphandle kokufumana isohlwayo. Ukuba uthatha isigqibo sokuthatha inxaxheba, unika imvume yakho ngokusayina isibhengezo esingezantsi kolu xwebhu.

Ingaba uza kufumana intlawulo ngokuthatha inxaxheba kwaye ingaba kukho iindleko ezibandakanyekayo?

Awusayi kufumana ntlawulo ngokuthatha inxaxheba kolu phononongo, kwaye akukho zindleko kuwe ukuba uyavuma ukuthatha inxaxheba.

Ingaba ikhona enye into ekufuneka ukuba uyazi?

Ukuba kukho naziphi na iinkcukacha ezingachazwanga kweli phetshana leenkcukacha kwaye ufuna naziphi na ezinye iinkcukacha okanye ufumana naziphi na iingxaki, ungaqhagamshelana noNks. E.C. Nicholson ku 0798544216.

Enkosi ngokuthatha ixesha lokufunda eli phetshana leenkcukacha nangokuthatha inxaxheba kolu phononongo. Qhagamshelana nam ngokukhululekileyo okanye umongameli wam ophetheyo kule nombolo ichazwe apha ngentla ukuba mhlawumbi kungenzeka kuthi kanti kukho umba ongaqinisekanga ngawo.

ISIBHENGEZO SOMTHATHI-NXAXHEBA (UKUNIKA IMVUME YOKUTHATHA INXAXHEBA KOLU PHONONONGO)

Ndibhengeza okokuba:

- Ndiyifundile, okanye ndicaciselwe ngale ncwadana yeenkcukacha kunye nefomu yokunika imvume.
- Ndikuqonda ngokupheleleyo okuqulathwe kolu xwebhu.
- Ndiyayiqonda injongo yale projekthi yophando.
- Ndilinikiwe ithuba lokubuza imibuzo kwaye loo mibuzo iphendulwe ngokwanelisayo.
- Ndiyaqonda ukuba ukuthatha kwam inxaxheba kokokuzithandela.
- Ndiyaqonda ukuba ndikhululekile ukuba ndingarhoxa kuphononongo nangeliphi na ixesha ngaphandle kokufumana isohlwayo, isigwebo okanye ukubekwa ityala.
- Ndiyaqonda ukuba ingxelo yophando iyakuthi iqulathe okufunyanisiweyo kolu phononongo, ngaphandle kokunyhashwa kwelungelo lam lemfihlelo.
- Ndiyavuma ukugcwalisa iphepha lemibuzo endilinikiweyo,

Sityikityelwe (indawo) e_____ Umhla: _____

_____

Utyikityo lomthathi-nxaxheba

ISIBHENGEZO SOMPHANDI

Ndibhengeza okokuba:

- Ndimcacisele ngokwaneleyo injongo yophononongo lophando lo mthathi-nxaxheba.
- Ndimkhuthazile umthathi-nxaxheba ukuba abuze imibuzo kwaye athathe ixesha elaneleyo ukuba ayiphendule.
- Ndanelisekile kukuba uyiqonda ngokwaneleyo yonke imiba yolu phando, njengoko icacisiwe kolu xwebhu.
- Ndiyisebenzisile/andiyisebenzisanga itoliki.

Sityikityelwe (*indawo*) e _____ Umhla: _____

_____

Utyikityo lomphandi

ISIBHENGEZO SETOLIKI

Ndibhengeza okokuba:

- Ndiyichazile yonke imiba ebalulekileyo njengokuba ichazwe kolu xwebhu.
- Yonke imibuzo iphendulwe ngesiXhosa
- Ndanelisekile kukuba umthathi-nxaxheba ukuqonda ngokupheleleyo okuqulathwe lolu xwebhu lokunika imvume esekelwe kulwazi kwaye nemibuzo yakhe yonke iphendulwe ngokwanelisayo.

Sityikityelwe (indawo) e_____ Umhla: _____

_____

Utyikityo lwetoliki

Appendix 7: Data collection instrument

DATA COLLECTION INSTRUMENT QUESTIONAIRE

MN

Dear Colleagues

The **aim** of this study is to determine the factors associated with safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province.

Please note:

The following terms and definitions will be used within the context of safe medication administration in specified residential facilities for older persons within the Metro-North, Western Cape Province.

Medication administration is one phase of the medication management process, including the check of the doctor's script for accuracy, possible contraindications for example drug interactions or allergies, administering the medication and the evaluation of the resident after administration (Ferrah *et al.*, 2017: 433–442).

Medication errors (MEs) are described as any error that is medicine related, occurring in any medication process stage, which can lead to harm, suffering, unnecessary hospitalization, additional costs and death (Metsälä & Vaherkoski, 2014: 12).

Medication Administration Record/s (MAR/MARs) are the record utilized to record dosages, dosages changes, discontinuation of medication, and alteration of medication (Szczepura *et al*. 2011: 1–10).

"Near misses" refers to the errors that almost occurred, but was observed by the nurse administrating the medication, timeously (Szczepura *et al*. 2011: 1–10).

Ethical principles with reference to confidentiality, privacy and anonymity will be adhered to as stated in the consent form.

DECLARATION BY PARTICIPANT (CONSENT TO PARTICIPATE IN THIS STUDY)

I agree to participate in the research study. I understand the purpose and nature of this research project and I understand that my participation is voluntary. I am aware that I am free to withdraw from the study at any time without any penalty, judgment, or blame.

Yes	No

SECTION A: SOSIO-DEMOGRAPHICS

How old are you currently? _____

Please enter your gender

Female	Male

Indicate your nurse category

Senior RN	RN	EN	ENA

Choose your level of nursing education

1- year certificate in nursing (ENA course)	2-year certificate in nursing (EN course)	Diploma in nursing	Degree in nursing	Masters' degree	Doctorate degree

Are you currently busy with further nursing studies that would lead to registration at SANC?

Yes	No

How many complete years' work experience does you have in residential facilities for older persons?

1-12 months	>1 year – ≤ 2 years	>2 years – ≤ 3 years	>3 years – ≤ 4 years	>4 years – ≤ 9 years	>9 years

Indicate whether you are full-time or part-time employed at the moment.

Full time	Part-time

If part-time, how many shifts do you work?

_____

Indicate who you are employed by

The facility	Nursing agency

SECTION B: INSTITUTIONAL POLICIES, MEDICATION TRAINING, MEDICATION SUPPLY, ADMINISTRATION, AND STORAGE
Where are residents' medications dispensed from?

		1. Yes	2. No
1	A trolley that is taken directly to the residents		
2	A locked cupboard within the resident's own room		
3	The nurse's office/treatment room i.e., trolley stays in treatment room and medication containers is taken out and carried to the resident by nurse/carer		
4	Medication is prepared in advance in the nurse's office and pill dispensers is taken out and carried to the resident by nurse/carer		
5	Any combination of the above		

If you select that you use any combinations above, select a combination of the procedure where you dispensed residents' medications from (Please tick any that apply).

		1. Yes	2. No
1	A trolley that is taken directly to the residents		
2	A locked cupboard within the resident's own room		
3	The nurse's office/treatment room i.e., trolley stays in treatment room and medication containers is taken out and carried to the resident by nurse/carer		
4	Medication is prepared in advance in the nurse's office and pill dispensers is taken out and carried to the resident by nurse/carer		

Do you have a recognized medication policy in the facility?

Yes	No	Not sure

If you answered yes to the previous question, how often are you required to read this policy?

Only when starting at the facility	Every 6 months	Yearly	No specified time periods

If you answered yes that you do have a medication policy, where in the facility is this policy kept?

In the medication room	In the unit (frail care)	RN office	Unsure

Which do you think are the most common reasons for medication errors? (Please tick any that apply)

1	Staff are overworked	
2	Staff are under stress	
3	Poor/insufficient knowledge of the action of medications and their side effects	
4	Under pressure to complete drug round in a certain amount of time	
5	Interruptions to the round from other staff and residents	
6	Current system of drug administration is confusing and open to error	
7	Lack of training	
8	Shortage of appropriately qualified staff	

Which, if any, of the following medication errors have you seen in your facility? (Please tick any that apply)

1	Wrong dosage being given	
2	Medication given to the wrong resident	
3	Wrong medication given	
4	Medication given at the wrong time	
5	Medication missed altogether	
6	Administering medications that have been discontinued	

Which do you think are the most common errors of medication accountability? (Please tick any that apply)

1	Not signing for medication given	
2	Not recording reasons for non-administration	
3	Not recording actual amount given for variable dose prescriptions (e.g., “1 or 2 to be given”)	
4	Not recording time given for PRN medications	
5	Not booking in medication stock received	
6	Not having a witness sign for changed made to the MAR	

How long ago did you last attend medication administration training?

In the last 6 months	In the last year	Between 1 and 5 years ago	Longer than 5 years ago

Did your training involve looking at the side effects of common medications?

Yes	No

Did your training involve looking at what some common medications do?

Yes	No

Do you know the purpose for of all of the drugs that you give out?

Always	Sometimes	Never

In a normal week, how often would you administer medicines?

9-12 rounds per week (during most day shifts per week)	4-8 rounds per week (during some of the day shifts per week)	3-4 rounds per week (during most night shifts per week)	1-3 rounds per week (only when needed e.g., in emergencies, staff shortages, and some night shifts per week)

How confident are you that your current drug administration system is safe, that residents get correct medication at correct time?	Very confident	Fairly confident	Fairly lacking in confidence	No confidence
How confident are you that your current drug administration system is time efficient with regards to the duration of medication round?	Very confident	Fairly confident	Fairly lacking in confidence	No confidence
How confident are you that your current system is the best given the number of staff available to dispense medicines?	Very confident	Fairly confident	Fairly lacking in confidence	No confidence

Approximately how long does a drug round take at present in the mornings?	Less than 30 minutes	>30 minutes – ≤ 1 hour	>1 hour – ≤ 2 hours	>2 hours
Approximately how long does a drug round take at present at lunchtime?	Less than 30 minutes	>30 minutes – ≤ 1 hour	>1 hour – ≤ 2 hours	>2 hours
Approximately how long does a drug round take at present in the evening?	Less than 30 minutes	>30 minutes – ≤ 1 hour	>1 hour – ≤ 2 hours	>2 hours

Are you aware of incidences of any 'near misses' (i.e., times where an error has almost occurred, but the administrator has noticed just in time) in the facility?

Yes	No

Do you generally carry out the drug round alone?

Yes	No

How at ease are you with carrying out a drug round on your own?	Not at ease at all	Somewhat uneasy	Fairly at ease	Extremely at ease

What are the pitfalls/problems associated with your current method of medication stock control? (Please tick any that apply)

1	Time consuming	
2	Easy to make a mistake	
3	Run out of stock before next order	
4	Order too much stock (i.e., potential for stock to go out of date – stock wastage)	
5	Involves too many staff members	
6	Uses too much storage space	
7	Do not know how much we have in stock at any one time	

SECTION C: ALTERATIONS TO MAR (MEDICATION ADMINISTRATION RECORD/CHART)

Who is allowed to make changes to MAR sheets (e.g., dosage changes, discontinuation of meds etc.)? (Please tick any that apply)

RN	EN	ENA	Doctor

Is a signature required when alterations are made to MARs?

Yes	No

Is a witness signature required when amendments are made to MARs?

Yes	No

SECTION D: SPECIAL CIRCUMSTANCES IN MEDICATION ADMINISTRATION

Some meds normally require some form of checking action prior to administration. In your facility do you undertake any of the following? (Please tick any that apply)

1	Pre-issue Pulse recording for digoxin	
2	Regular BP monitoring for those on blood pressure medications	
3	Glucose monitoring for insulin	

Thinking about medications that require some checking action prior to administration e.g., pulse recording for digoxin, blood glucose monitoring for insulin, etc. have you received training in last 12 months in order to carry out these resident checks?

Yes	No

Please read the following statements and answer the questions below:

Statement 1: 'Staff administering medications assume that the content of the blisters/containers is correct and therefore do not need checking thoroughly.'

Do you think that this statement is true or untrue for your facility?

True	Untrue

Have you ever come across a situation where the content of blisters/containers was wrong?

Yes	No

Do you think that with blisters/containers, some people do not make thorough checks?

Yes	No

Statement 2: 'Staff assume that the blisters/containers on the racks are up-to-date (i.e., no one has taken any off or added any on).'

Do you think that this statement is true or untrue for your facility?

True	Untrue

Have you ever come across a situation where the blisters/containers were wrong?

Yes	No

Do you think that with blisters, some people do not make thorough checks?

Yes	No

Statement 3: Staff assume that the blisters/containers on the racks are placed in the correct residents' section.

Do you think that this statement is true or untrue for your facility?

True	Untrue

Have you ever come across a situation where the blisters/containers were wrong?

Yes	No

Do you think that with blisters, some people do not make thorough checks?

Yes	No

Statement 4: Interim medicines can be supplied in the middle of the month. Because they are supplied in the middle, blisters/containers may not be placed on the racks in the correct position. Thus, there is a risk of them getting missed out of the normal drug administration system.

Is this a real risk in your facility?

Yes	No

Have you ever seen medicines being missed under this circumstance?

Yes	No

Have you ever come across blisters/containers placed on the racks in the incorrect position?

Yes	No

Statement 5: 'Interim medicines, can be supplied in the middle of the month. Because they are supplied in the middle, there is a risk of some medications that are not blistered (because they are not able to go on the racks e.g., may be in the fridge) being missed.'

Is this a real risk in your facility?

Yes	No

Have you ever seen medicines being missed under this circumstance?

Yes	No

Statement 6: 'Because everything is supplied in blisters, dose changes during the month would have to be added to, or removed from the racks, thus there is risk of medicines not being administered properly'.

Do you think that this statement is true or untrue for your facility?

True	Untrue

Have you ever come across situations where the changes were not made?

Yes	No

Statement 7: 'The racking /storage system presents some difficulties.'

Do you think that this statement is true or untrue for your facility?

True	Untrue

Is the system bulky?

Yes	No

Do you think it is easy to pop out the tablets from the racks?

Yes	No

Do you ever find that the blisters are not in the right order?

Yes	No

Do you ever find someone's blisters in the wrong section of the rack?

Yes	No

Does opening blisters ever injure your fingers?

Yes	No

Statement 8: 'Blisters/ containers are on the racks in the order that the patients usually have their medicines, but sometimes residents are not there when it is their turn and could risk getting missed.'

Do you think that this statement is true or untrue for your facility?

True	Untrue

Have you ever known it to happen?

Yes	No

What method is used to prevent this happening? (Please tick any that apply)

Note on MAR	Check blisters/containers at end of round	Write on notepad	No prompt required

Statement 9: One thing that health auditors look for on MAR sheets is missing entries.
Why do you think missing entries are not recorded? (Please tick any that apply)

Time pressure	People forget	Not enough space on MAR charts

Statement 10: Health auditors also look for recorded reasons why medications have not been given.'
Why do you think reasons for non-administration are not recorded? (Please tick any that apply)

Time pressure	People forget	Not enough space on MAR charts

Statement 11: Health auditors look to see whether the number/dose of PRN medication is recorded on the MAR sheets.'
Why do you think the number/dosage of PRN medications is sometimes not recorded? (Please tick any that apply)

Time pressure	People forget	Not enough space on MAR charts

Statement 12: 'Sharing of some resident medicines, e.g., Lactulose and Movicol is unavoidable.'

Why do you think this happens? (Please tick any that apply)

Not enough room on trolley	Residents own stock has run out	New medication has been prescribed, so no stock available for that resident	Medication was not stored within the trolley, but elsewhere

Have you ever seen this practice of sharing?

Frequently	Fairly frequently	Rarely	Never

Statement 13: 'New entries indicating any medication changes are usually made as new entries and countersigned.'

Do you come across occasions where the MAR chart has been changed rather than a new entry made?

Yes	No

Do you come across occasions where the changes are not signed by two people?

Yes	No

Do you sometimes find it difficult to decipher other people's handwriting?

Yes	No

Statement 14: 'Some residents may have a number of MAR sheets plus an interim MAR sheet which may be placed at the back of existing sheets. This increases the risk of medications being missed.' Have you seen this happen?

Frequently	Fairly frequently	Rarely	Never

When you are off for a few days how do you inform yourself of medication changes? (Please tick any that apply)

Study MAR charts	Discuss with colleagues	Ask residents

When do you usually sign the MAR sheets? (Please tick any that apply)

1	Sign before potting (sign after preparing medicines in pill dose containers in advance for later administration)	
2	Sign after potting (sign after preparing medicines in pill dose containers in advance for later administration)	
3	Sign when given to resident from blister/medication container)	
4	Sign when given to resident from pill dose container (daily/weekly container)	

Have you ever seen or suspected that MAR charts have been signed on mass (all charts signed together at the same time)?

Yes	No

What is your opinion of the MAR chart folder? Do you find it too bulky?

Yes	No

Is it easy to find patients MAR charts in the folder?

Yes	No

Do the MAR chart holes get damaged and slide out?

Yes	No

SECTION E: USE OF COMPUTERS AT HOME AND AT WORK

How often do you use a computer at your house?

Never	Daily	Weekly	Monthly

If you answered daily/weekly/monthly at the previous question, please complete this question

What do you use a computer at your house for? (Please tick any that apply)

1	Playing games	
2	Spreadsheets	
3	Word processing	
4	Email	
5	Internet for information gathering	
6	Internet for finance	
7	Internet for chat/ discussion rooms	
8	Internet for shopping	

If you have a computer or access to a computer at work, how often do you use it at work?

Never	Daily	Weekly	Monthly

If you answered daily/weekly/monthly at the previous question, please complete this question.

What do you use a computer at work for? (Please tick any that apply)

1	Patient data/records (e.g., blood results, x-rays, etc.)	
2	Work emails	
3	Ordering / stock control	
4	Word processing	
5	Management (e.g., off duty, bed status)	
7	Internet for information gathering	
8	Spreadsheets	
9	Internet for work chat / discussion groups	

Do you have any formal training in computer use?

Yes	No

How would you rate your experience in terms of computer use?

Very inexperienced	Fairly inexperienced	Average	Fairly experienced	Very experienced

SECTION F: USE OF MOBILE PHONES

Are you allowed to use your personal phone for work purposes?

Yes	No

If you answered yes in the previous question, please answer the following questions: What kind of things do you regularly do with your mobile phone at work? (Please tick any that apply)

1	Make work related calls	
2	Text work related people	
3	Take work related photographs	
4	Check work related emails	
5	Surf the internet for work related information	
6	Create work related documents	
7	Instant messaging	
8	Use as calculator	
9	Set reminders	

SECTION G: SOURCES OF PRESSURE YOU MAY COME ACROSS AS PART OF YOUR WORK

The following section asks you questions about the pressures that you may come across as part of your work. Please indicate your level of job pressure, by choosing one option at each question.

		1.No pressure	2. Low pressure	3. Moderate pressure	4. High pressure
1	Increased demands from residents.				
2	Inappropriate demands from residents.				
3	Dealing with problem residents.				
4	Dealing with very ill residents and their relatives.				
5	Dealing with earlier discharges from hospital.				
6	Worry about complaints/litigation.				
7	24-hour responsibility for residents.				
8	Working environment and home set-up.				
9	Insufficient time to do justice to the job.				

10	Fear of assault at work.				
11	Disturbance of home/family life by work.				
12	Dividing time between work and spouse/family.				
13	Unrealistic high expectations of role by others.				
14	Unsociable hours.				
15	Insufficient resources within the facility.				
16	Dealing with conflict within the facility.				
17	Long working hours.				
18	Paperwork.				
19	Organizational changes in the facility.				
20	Adverse publicity by media.				
21	Lack of support within the facility.				
22	Emphasis on resource issues in the facility.				
23	The pace of change within the facility.				
24	Professional isolation.				
25	Increased workloads.				
26	Lack of appreciation from residents.				

Appendix 8: Permission for the use of data collection instrument

From: Szczepura, Ala <Ala.Szczepura@warwick.ac.uk>
Sent: 30 May 2019 10:52
To: emerentia65@gmail.com
Cc: DEIDRE WILD; Clive Bowman; Tariq Muhammad
Subject: RE: Data Collection Questionnaire

Dear Emerentia,

Thank you for your email.

I am very happy for you to use our data collection questionnaire (with adjustment) to explore medication errors in long term residential facilities for older persons in the Western Cape.

Please can you keep us informed of your progress?

PS It is best to use my Coventry University email address below – I access this more regularly than Warwick email.

Kind regards
Ala

_____

Ala Szczepura | Professor of Health Technology Assessment | Enterprise & Innovation
Academic Lead – Inter-Faculty DDRI Programme (technology-enabled healthy ageing)
Coventry University, Priory Street, Coventry, UK, CV1 5FB
M: +44 (0) 7557 425 463 | e. ala.szczepura@coventry.ac.uk |

From: emerentia65@gmail.com <emerentia65@gmail.com>
Sent: 28 April 2019 10:49
To: 'Ala.szczepura@warwick.ac.uk' <Ala.szczepura@warwick.ac.uk>
Subject: Data Collection Questionnaire

Dear Professor Szczepura

Your article published in BMC Geriatrics refer.
“Szczepura *et al*.: Medication administration errors for older people in long-term residential care. BMC Geriatrics 2011 11:82”.

I am a student busy with a Master of Nursing Science at the faculty of Medicine and Health Sciences at the Stellenbosch University, South Africa. My intention is to explore the medication errors in long term residential facilities for older persons in the Western Cape.

Therefor I would like to ask your permission to use your very comprehensive pre-introduction data collection questionnaire, with adjustment of some terminology to fit our local context.

Thank you very much, looking forward to hearing from you.

Kind regards / Vriendelike groete
Emerentia Snyman
0798544216
Student no: 20068948

Appendix 9: Pilot test questionnaire

Date: _____ **Code:**

SECTION A

1.	Home Code	
2.	Age	
3.	Gender	Male 1☐ Female 2☐
4.	Job Role: 1. Care Home Manager 2. Senior RGN 3. Other RGN 4. Care Worker 5. Senior Care Worker 6. Other (please state): Answer: ……	☐ ☐ ☐ ☐ ☐ ☐
5.	Grade	
6.	Qualifications 1. RGN Level 1 2. NVQ 2 3. NVQ 3 4. NVQ 4 5. No Qualification 6. Other (please specify) Answer: ……	☐ ☐ ☐ ☐ ☐ ☐
7.	Are you currently in training for NVQ 3? 1. Yes 2. No	☐ ☐
8.	Job title:	
9.	How long working in residential care (months)	
10.	How long working in nursing home care (months)	
11.	Are you: 1. Full time 2. Part-time 3. If part-time, how many hours/days per week do you work?	☐ ☐

	Answer: ……	
12.	Are you: employed by: 1. The Home 2. Nurse Bank 3. Agency	 ☐ ☐ ☐

SECTION B

The following questions will ask you about your experiences of medication supply, administration, and storage. All your answers are completely confidential and only the research team will see individual questionnaires. A study code will only identify you.

13.	Where are residents' medications dispensed from? 1. A trolley that is taken directly to the residents 2. A locked cupboard within the resident's own room 3. The nurse's office/treatment room (i.e., trolley stays in treatment room and medication is taken out to the resident by nurse/carer) 4. Other (please state) 5. Any combination of 13.1; 13.2; 13.3; 13.4 (please state) Answer: ……	 ☐ ☐ ☐ ☐ ☐
14.	Do you have a recognized medication policy in the home? 1. Yes 2. No 3. Not sure	 ☐ ☐ ☐
15.	If yes, how often are you required to read this policy? 1. Only when starting at the home 2. Every 6 months 3. Yearly 4. No specified time periods 5. Other (please state) Answer: ……	 ☐ ☐ ☐ ☐ ☐
16.	Where in the home is this policy kept? Answer: ……	
17.	Which do you think are the most common reasons for drug errors? (Please tick any that apply). 1. Staff are overworked 2. Staff are under stress 3. Poor/insufficient knowledge of the action of medications and their side effects 4. Under pressure to complete drug round in a certain amount of time 5. Interruptions to the round from other staff and residents 6. Current system of drug administration is confusing and open to error	 ☐ ☐ ☐ ☐ ☐ ☐

	7. Lack of training 8. Shortage of appropriately qualified staff 9. Other (please state) Answer: ……	☐ ☐ ☐
18.	Which, if any, of the following errors have you seen in your home? Please tick any that apply. 1. Wrong dosage being given 2. Medication given to the wrong resident 3. Wrong medication given 4. Medication given at the wrong time 5. Medication missed altogether 6. I have not seen any of these errors in my home 7. Administering medications that have been discontinued 8. Other type of error (please give examples) Answer: …… ……	 ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
19.	Which do you think are the most common errors of medication accountability? Please rate from 1 – 7 with 1 being is the 'most common' and 7 being the 'least common'. (Interview question: which if any of these errors have you seen in your home?) 1. Not signing for medication given 2. Not recording reasons for non-administration 3. Not recording actual amount given for variable dose prescriptions (e.g., "1 or 2 to be given") 4. Not recording time given for PRN medications 5. Not booking in supplies 6. Not having a witness sign for changed made to the MAR 7. Other type of error (please specify) Answer: …… 8. I have not seen any of these errors	 ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
20.	How long ago did you last attend drug administration training? months/years ……	
21.	Did your training involve looking at the side effects of common medications? 1. Yes 2. No	 ☐ ☐
22.	Did your training involve looking at what some common medications do? 1. Yes 2. No	 ☐ ☐
23.	Do you know the purpose for of all of the drugs that you give out? 1. Always 2. Almost always 3. Sometimes 4. Almost never	 ☐ ☐ ☐ ☐

	5. Never	☐
24.	In a normal week, how often would you administer drugs?..... times/week	
25.	How confident are you that your current drug administration system is? 1. Safe: residents get correct medication at correct time (Please tick the answer that best matches how you feel). 1.1 Very confident 1.2 Fairly confident 1.3 Neither confident nor lacking confidence 1.4 Fairly lacking confidence 1.5 No confidence 2. Time efficient re: duration of medication round (Please tick the answer that best matches how you feel). 2.1 Very confident 2.2 Fairly confident 2.3 Neither confident nor lacking confidence 2.4 Fairly lacking confidence 2.5 No confidence 3. How confident are you that your current system is the best given the number of staff available to dispense medicines? (Please tick the answer that best matches how you feel). 3.1. Very confident 3.2 Fairly confident 3.3. Neither confident nor lacking confidence 3.4. Fairly lacking confidence 3.5. No confidence	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
26.	Approximately how long does a drug round take at present? 1. Early morning 2. Lunchtime 3. Teatime 4. Bedtime	Mins …. Mins …. Mins …. Mins ….
27.	Are you aware of incidences of any ‘near misses’ (i.e., times where an error has almost occurred but the administrator has noticed just in time) in the home? 1. Yes 2. No	☐ ☐
28.	Do you generally carry out the drug round? 1. Alone 2. Or with another person	☐ ☐

29.	How at ease are you with carrying out a drug round on your own? (please circle the number that best fits your level of ease)							
	1	2	3	4	5	6	7	
	Not at all at ease						Extremely at ease	
30.	What are the pitfalls/problems associated with your current method of stock control? (please tick any that apply). 1. Time consuming 2. Easy to make a mistake 3. Run out of stock before next order 4. Order too much stock (i.e., potential for stock to go out of date – stock wastage) 5. Involves too many staff members 6. Uses too much storage space 7. No problem 8. Do not know how much we have in stock at any one time							☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
31.	If you ticked any of the answers at 30 above, which of these is the most frequent problem and which is the least frequent problem? (please choose a letter from 30.1 – 30.7) 1. Most frequent problem is Answer: …… 2. Least frequent problem is Answer: ……							

SECTION C

Alterations to MARs

32.	Who is allowed to make changes to MAR sheets (e.g., dosage changes, discontinuation of meds etc.)? 1. Care Home Manager 2. Senior RGN 3. Senior Managers 4. Other RGNs 5. Care Staff (with med training) 6. Other care staff 7. GP 8. Other (please state)	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
33.	Is a signature required when alterations are made to MARs? 1. Yes 2. No	☐ ☐

34.	Is a witness signature required when amendments are made to MARs? 1. Yes 2. No	 ☐ ☐

SECTION D

Special Circumstances

35.	Some meds normally require some form of checking action prior to administration. In your home do you undertake any of the following: 1.1 Pre-issue Pulse recording for digoxin 1. Yes 2. No 1.2 Regular BP monitoring for those on blood pressure medications 1. Yes 2. No 1.3 Glucose monitoring for insulin 1. Yes 2. No	 ☐ ☐ ☐ ☐ ☐ ☐
If you answered 'yes' to any of 35.1; 35.2 or 25.3 above, please complete questions 36-37.		
36.	Thinking about medications that require some checking action to prior to administration e.g., pulse recording for digoxin, blood glucose monitoring for insulin, etc. have you received training in order to carry out these resident checks? 1. Yes, I have received training 2. No, I have NOT received training	 ☐ ☐
37.	If you HAVE received training from whom/where did you receive this training? 1. RGN training 2. In-house training course (i.e., arranged by company) 3. RGN in my home 4. GP 5. District/community nurse 6. Other (please state) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐
38.	Where are checks (e.g., pulse/blood sugar recordings) noted? 1. On the MAR sheet only 2. On MAR and care plan/notes 3. In residents care/nursing notes plan only 4. Other (please specify)	 ☐ ☐ ☐ ☐

	Answer: ……	
39.	Please read the following statements and answer the questions below:	
	1. Statement 1: 'Staff administering medications assume that the content of the blisters is correct and therefore do not need checking thoroughly.' 1.1 Do you think that this statement is true or untrue? 1. True 2. Untrue 1.2 Have you ever come across a situation where the blisters were wrong? 1. Yes 2. No 1.3 Do you think that with Blisters, some people do not make thorough checks? 1. Yes 2. No 1.4 I have found no problems with this 1. Agree 2. Disagree	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
	2. Statement 2: 'Staff assume that the blisters on the racks are up-to-date (i.e., no one has taken any off or added any on).' 2.1 Do you think that this statement is true or untrue? 1. True 2. Untrue 2.2. Have you ever come across a situation where the blisters were wrong? 1. Yes 2. No 2.3. Do you think that with Blisters, some people do not make thorough checks? 1. Yes 2. No 2.4. I have found no problems with this 1. Agree 2. Disagree	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
	3. Statement 3: Staff assume that the blisters on the racks are placed in the correct residents' section. 3.1. Do you think that this statement is true or untrue? 1. True 2. Untrue 3.2. Have you ever come across a situation where the blisters were wrong? 1. Yes 2. No 3.3. Do you think that with Blisters, some people do not make thorough checks: 1. Yes 2. No	☐ ☐ ☐ ☐ ☐ ☐

	3.4. I have found no problems with this 1. Agree 2. Disagree	 ☐ ☐
	4. Statement 4: Interim medicines can be supplied in the middle of the month. Because they are supplied in the middle, blisters may not be placed on the racks in the correct position. Thus, there is a risk of them getting missed out of the normal drug administration system 4.1 Is this a real risk? 1. Yes 2. No 4.2 Have you ever seen medicines being missed under this circumstance? 1. Yes 2. No 4.3 Have you ever come across blisters placed on the racks in the incorrect position? 1. Yes 2. No	 ☐ ☐ ☐ ☐ ☐ ☐
	5. Statement 5: 'Interim medicines, can be supplied in the middle of the month. Because they are supplied in the middle, there is a risk of some medications that are not blistered (because they are not able to go on the racks e.g., may be in the fridge) being missed.' 5.1 Is this a real risk? 1. Yes 2. No 5.2 Have you ever seen medicines being missed under this circumstance? 1. Yes 2. No	 ☐ ☐ ☐ ☐
	6. Statement 6: 'Because everything is supplied in blisters, dose changes during the month would have to be added to, or removed from the racks, thus there is risk of medicines not being administered properly'. 6.1 Do you think that this statement is true or untrue for your home? 1. True 2. Untrue 6.2 Have you ever come across situations where the changes were not made? 1. Yes 2. No 6.3 Are there other risks? 1. Yes 2. No	 ☐ ☐ ☐ ☐ ☐ ☐
	7. Statement 7: 'The racking system presents some difficulties.' 7.1 Do you think that this statement is true or untrue for your home? 1. True 2. Untrue 7.2 Is the system bulky? 1. Yes	 ☐ ☐ ☐

	2. No 7.3 Is it a pain to have to swap the different racks round? 1. Yes 2. No 7.4 Do you think it is easy to pop out the tablets from the racks? 1. Yes 2. No 7.5 Do you ever find that the blisters are not on the right racks? 1. Yes 2. No 7.6 Do you ever find that the blisters are not in the right order? 1. Yes 2. No 7.7 Do you ever find someone's blisters in the wrong section of the rack? 1. Yes 2. No 7.8 Does opening blisters ever injure your fingers? 1. Yes 2. No 7.9 I do not find any problems with the racking system 1. Agree 2. Disagree	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
	8. Statement 8: 'Blisters are on the racks in the order that the patients usually have their medicines, but sometimes residents are not there when it is their turn and could risk getting missed.' 8.1 Do you think that this statement is true or untrue for your home? 1. True 2. Untrue 8.2 Have you ever known it to happen? 1. Yes 2. No 8.3 What method is used to prevent this happening? (Please tick all that apply) 1. MAR 2. Check Blisters at end of round 3. Notepad 4. No prompt required 5. Other (please specify) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
	9. Statement 9: MAR charts are easier to use when additional identifiers are used (color coding or other similar) to show you which medicines are due and at which time. 9.1 Is this statement true or untrue? 1. True 2. Untrue	 ☐ ☐

	9.2 Do you think there is a greater risk of medicines being missed when MAR charts do not have additional identifiers e.g., color coding? 1. Yes 2. No 9.3 Have you ever come across an instance when the color coding was wrong? 1. Yes 2. No	☐ ☐ ☐ ☐
	10. Statement 10: One thing that CSCI inspectors look for on MAR sheets is missing entries 10.1 Were you aware of this? 1. Yes 2. No 10.2 Why do you think missing entries are not recorded? 1. Time pressure 2. Not enough space on MAR charts 3. I have found no problem with this 4. Other reasons (please specify) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐
	11. Statement 11: 'CSCI inspectors also look for recorded reasons why medications have not been given.' 11.1 Were you aware of this? 1. Yes 2. No 11.2 Why do you think reasons for non-administration are not recorded? 1. Time pressure 2. Not enough space on MAR charts 3. I have found no problem with this 4. Other reasons (please specify) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐
	12. Statement 12: 'CSCI inspectors look to see whether the number/dose of PRN medication is recorded on the MAR sheets.' 12.1 Were you aware of this? 1. Yes 2. No 12.2 Why do you think the number/dosage of PRN medications is sometimes not recorded? 1. Time pressure 2. Not enough space on MAR charts 3. I have found no problem with this 4. Other reasons (please specify) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐
	13. Statement 13: 'Sharing of some resident medicines, e.g., Lactulose and Movicol is unavoidable.'	

	13.1 Do you think that this statement is true or untrue for your home? 1. True ☐ 2. Untrue ☐ 13.2 Why do you think this happens? (please tick any that apply) 1. Not enough room on trolley ☐ 2. Residents own stock has run out ☐ 3. New medication has been prescribed, so no stock available for that resident ☐ 4. Other (please state) ☐ Answer: …… 13.3 Have you ever seen this practice of sharing? 1. Frequently ☐ 2. Fairly frequently ☐ 3. Rarely ☐ 4. Never ☐ 13.4 Was it to do with storing and finding the medicines within the trolley? 1. Yes ☐ 2. No ☐ 13.5 Do you think being able to store this type of medication within the trolley, would reduce the incidence of sharing medicines? 1. Yes ☐ 2. No ☐	
	14. Statement 14: 'New entries indicating any medication changes are usually made as new entries and countersigned.' 14.1 Do you think that this statement is true or untrue for your home? 1. True ☐ 2. Untrue ☐ 14.2 Do you come across occasions where the MAR chart has been changed rather than a new entry made? 1. Yes ☐ 2. No ☐ 14.3 Do you come across occasions where the changes are not signed by two people? 1. Yes ☐ 2. No ☐ 14.1 Do you sometimes find it difficult to decipher other people's handwriting? 1. Yes ☐ 2. No ☐	
	15. Statement 15: 'Some residents may have a number of MAR sheets plus an interim MAR sheet which may be placed at the back of existing sheets. This increases the risk of medications being missed.' 15.1 Do you think that this statement is true or untrue for your home? 1. True ☐ 2. Untrue ☐ 15.2 Have you seen this happen?	

	1. Frequently 2. Fairly frequently 3. Rarely 4. Never	☐ ☐ ☐ ☐
40.	When you are off for a few days how do you inform yourself of medication changes? Please tick any that apply. 1. Study MAR charts 2. Discuss with colleagues 3. Ask residents 4. Other (Please specify) Answer: ……	 ☐ ☐ ☐ ☐
41.	1.1 When do you usually sign the MAR sheets? 1. Sign before potting 2. Sign after potting 3. Use both practices equally 4. Other (please specify) Answer: …… 1.2 Have you ever seen or suspected that MAR charts have been signed on mass? 1. Yes 2. No	 ☐ ☐ ☐ ☐ ☐ ☐
42.	What is your opinion of the MAR chart folder? 1.1 I have no problems with the MAR chart folder 1. Yes 2. No 1.2 Do you find it too bulky? 1. Yes 2. No 1.3 Is it easy to find patients MAR charts in the folder? 1. Yes 2. No 1.4 Do the MAR chart holes get damaged and slide out? 1. Yes 2. No 1.5 Other (please state) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
43.	What is your attitude towards the introduction of a new medication system to replace the one you are using? 1. Very keen 2. Fairly keen 3. Neither keen nor reluctant 4. Fairly reluctant 5. Very reluctant	 ☐ ☐ ☐ ☐ ☐

44.	Of the following, who do you think holds a positive attitude towards changing to a new medication system? (Tick all that apply) 1. Care Home Manager 2. Senior RGN 3. Senior Managers 4. Care Staff 5. Other RGNs 6. Residents/Relatives 7. Senior Care staff 8. GP 9. Other (please specify) Answer: …… 10. Who is the most positive and who is the least positive? Answer: ……	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
45.	Who of the following do you think holds a negative attitude towards changing to a new medication system? (tick all that apply) 1. Care Home Manager 2. Senior RGN 3. Senior Managers 4. Care Staff 5. Other RGNs 6. Residents/Relatives 7. Senior Care staff 8. GP 9. Other (please specify) Answer: …… 10. Who is the most negative and who is the least negative? Answer: ……	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

SECTION E

Computer use

This section will ask you a series of questions regarding your use of computers in the home and at work.

46.	How often do you use a computer at home? (Please tick the most appropriate answer) 1. Never 2. Daily 3. Weekly 4. Monthly	☐ ☐ ☐ ☐

47.	What do you use a home computer for? (Please tick all that apply) 1. Playing games 2. Spreadsheets 3. Word processing 4. Email 5. Internet for information gathering 6. Internet for finance 7. Internet for chat/discussion rooms 8. Internet for shopping 9. Other (please give details) Answer: ……	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
48.	How often do you use a computer at work? (please tick the most appropriate answer) 1. Never 2. Daily 3. Weekly 4. Monthly	☐ ☐ ☐ ☐
49.	What do you use a work computer for? (Please circle all that apply) 1. Patient data/records (e.g., blood results, x-rays, etc.) 2. Email 3. Ordering/stock control 4. Word processing 5. Management (e.g., off duty, bed status) 6. Playing games 7. Internet for information gathering 8. Spreadsheets 9. Internet for chat/discussion rooms 10. Internet for shopping 11. Other (please give details) Answer: ……	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
50.	Do you have any formal training in computer use (e.g., CLAIT, RSA, ECDL)? (Please circle the appropriate answer) 1. Yes 2. No	☐ ☐
51.	How would you rate your experience in terms of computer use? (Please circle the appropriate answer)	

0	1	2	3	4	5	6	7	8	9	10
Inexperienced										Experienced

52	How would you rate your confidence in terms of computer use? (Please circle the appropriate answer)	

		1	2	3	4	5	6	7	8	9	10	
	Confident										Low confidence	

SECTION F

Mobile Phones

The following section asks you about your mobile phone use.

53.	Do you own a mobile phone? 1. Yes 2. No	 ☐ ☐
54.	Do you own a PDA or smartphone? (E.g., iPhone, Blackberry, Palm etc.) 1. Yes 2. No	 ☐ ☐
55.	What kind of things do you regularly do with your mobile phone/smartphone? (Tick all that apply) 1. Make calls 2. Text people 3. Listen to music 4. Take photographs 5. Check emails 6. Surf the internet 7. Create documents 8. Instant messaging 9. Play games 10. Other (please specify) Answer: ……	 ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

SECTION G

Think about your current system of medication ordering, supply, storage, administration before answering the following questions 56-59.

52. Please identify up to 5 strengths for your current system of medication ordering, supply, storage, and administration. Explain briefly why for each, then rate them on a scale of 1-5, with 1 = unimportant, 2 = fairly unimportant 3 = neither unimportant nor important, 4 = fairly important 5 = very important

Strengths	Why?	Rate

53. Please identify up to 5 weaknesses for your current system of medication ordering, supply, storage, and administration. Explain briefly why for each, then rate them on a scale of 1-5, with 1 = unimportant, 2 = fairly unimportant 3 = neither unimportant nor important, 4 = fairly important 5 = very important

Weaknesses	Why?	Rate

54. Please identify up to 5 opportunities to strengthen your current system of medication ordering, supply, storage, and administration. Explain briefly why for each, then rate them on a scale of 1-5, with 1 = unimportant, 2 = fairly unimportant 3 = neither unimportant nor important, 4 = fairly important 5 = very important

Opportunities	Why?	Rate

55. Please identify up to 5 threats to your current system of medication ordering, supply, storage, and administration. Explain briefly why for each, then rate them on a scale of 1-5, with 1 = unimportant, 2 = fairly unimportant 3 = neither unimportant nor important, 4 = fairly important 5 = very important

Threats	Why?	Rate

SECTION H

Sources of Job Pressure

The following section asks you questions about the pressures that you may come across as part of your work.

56.	Using one of the following numbers, please indicate against each of the following items 60.1-60.26, your level of job pressure.	1= no pressure 2 = slight pressure 3 = moderate pressure 4 = considerable pressure 5 = high pressure
		Number
	1. Increased demands from residents.	.....
	2. Inappropriate demands from residents.	.....
	3. Dealing with problem residents.	.....
	4. Dealing with very ill residents and their relatives.	.....
	5. Dealing with earlier discharges from hospital	.....
	6. Worry about complaints/litigation.	.....
	7. 24-hour responsibility for residents.	.....
	8. Working environment and home set-up.	.....
	9. Insufficient time to do justice to the job.	.....
	10. Fear of assault at work.	.....
	11. Disturbance of home/family life by work.	.....
	12. Dividing time between work and spouse/family.	.....
	13. Unsociable hours.	.....
	14. Unrealistic high expectations of role by others.	.....
	15. Insufficient resources within the home.	.....
	16. Dealing with conflict within the home.	.....
	17. Long working hours.	.....
	18. Paperwork.	.....
	19. Organizational changes in the homes	.....
	20. Adverse publicity by media.	.....
	21. Lack of support within home.	.....
	22. Emphasis on resource issues in the home.	.....
	23. The pace of change within homes.	.....
	24. Professional isolation.	.....
	25. Increased workloads.	.....
	26. Lack of appreciation from residents.	.....

Appendix 10: Declaration of Afrikaans and isiXhosa translation of participant information leaflet and consent form

TAALSENTRUM
LANGUAGE CENTRE
IZIKO LEELWIMI

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

3 November 2020

Ms E Snyman
61 Ailsa Circle
Melkbosstrand
7441

Dear Ms Snyman

Translation of Consent Forms

The Stellenbosch University Language Centre hereby confirms that in February and March 2020 we translated your informed consent form into Afrikaans and isiXhosa.

Please contact me should you have any queries.

Regards

pp.

Marguerite van der Waal
Head: Language Service
Stellenbosch University Language Centre
Tel: 021 808 3096
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E-mail: mvdwaal@sun.ac.za

Appendix 11: Declaration of language and technical editor

VSE

Van Schalkwyk Editorial Services

Cell: 082 898 7218 | **Email:** arayofhope1@gmail.com

10/11/2020

To whom it may concern

I hereby confirm that I edited Emerentia Nicholson's master's thesis titled:

"FACTORS ASSOCIATED WITH SAFE MEDICATION ADMINISTRATION IN SPECIFIED RESIDENTIAL FACILITIES FOR OLDER PERSONS WITHIN THE METRO-NORTH, WESTERN CAPE PROVINCE"

Regards

Mr Aré van Schalkwyk